FIRM DIVERSIFICATION AND ASYMMETRIC INFORMATION

By

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TABLE OF CONTENTS

page

ACKNOWLEDGMENTS ii

ABSTRACT v

CHAPTERS

1 INTRODUCTION 1

2 EVIDENCE FROM EQUITY OFFERINGS 4

Introduction 4
A Model of Diversification and Equity Issues 10
Data and Empirical Design 21
Results 29
Conclusion 37

3 EVIDENCE FROM ANALYSTS' FORECASTS 44

Introduction 44
Hypotheses Development and Literature Review 48
Data and Empirical Design 54
Results 63
Conclusion 77

4 EVIDENCE FROM TRADING CHARACTERISTICS 88

Introduction 88
Hypothesis Development 90
Sample and Variable Construction 94
Results 102
Conclusion 112

5 DISCUSSION AND CONCLUSION 122

APPENDICES

A DERIVATION AND PROOFS 123
B MICROSTRUCTURE CALCULATIONS 128
REFERENCES 131
BIOGRAPHICAL SKETCH 139

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This dissertation examines the relationship between firm diversification and asymmetric information in three distinct contexts. First, we evaluate the effect of firm diversification on the equity issue process. In a sample of 641 equity issues conducted over the 1983-1994 time period, we find that, relative to issues by comparable focused firms, equity issues by diversified firms are viewed less negatively by the market.

Second, we examine the relationship between corporate diversification and proxies for asymmetric information derived from analysts' forecasts and abnormal returns associated with earnings announcements. In a sample of 12,282 firm-years over the 1985-1995 period, we find diversification is associated with both increases and decreases in our proxies. However, the findings are consistent with the hypothesis that, on balance, firm diversification actually helps reduce asymmetric information.

Finally, we examine the relationship between corporate diversification and proxies for asymmetric information derived from stock market liquidity data. In a sample of 3,629 firm-years over the 1993-1995 period, we find that diversification does not increase asymmetric information.

CHAPTER 1
INTRODUCTION

Managers possess private information about their firms. In the presence of asymmetric information, outsiders are subject to adverse selection in contracting with firm managers. However, in a rational expectations sense, firms will bear some of the outsiders' costs associated with the adverse selection. As a result, actions by managers (e.g., choice of capital structure policy, disclosure policy, diversification policy, and dividend policy) that reduce asymmetric information will lower the costs of contracting with outsiders. Accordingly, in much of the extant finance theory, many managerial choices are characterized as being determined by the desire to signal private information to outsiders. While firm diversification has attendant benefits (creation of an internal capital market and increased debt capacity) and costs (inefficient cross-subsidies), the impact of firm diversification on the degree of asymmetric information and, hence, adverse selection faced by outsiders is an open question.

Firm diversification may reduce the adverse selection faced by outsiders. For example, assume that the errors outsiders make in valuing the divisions of a firm are imperfectly correlated across divisions. This implies that the absolute value of the percentage error in the valuation of the firm will generally be smaller for a diversified firm than for an undiversified firm. In other words, while outsiders may make errors in valuing the divisions, if these errors are not perfectly positively correlated, then the percentage error in the market's valuation of a firm may be smaller for a diversified firm relative to a focused firm. Thus, the adverse selection problem faced by outsiders may be reduced by firm diversification.

Alternatively, diversified firms may be inherently harder to value than focused firms. The aggregate nature of diversified firms' accounting reports may make them less informative relative to focused firms. Segment disclosures may aid in this regard; however, managers still have much discretion over allocations and segment definitions. Further, a frequently-cited motivation for focus increasing transactions is management's desire to make the company easier for investors to value. If diversified firms are less transparent than focused firms, then the adverse selection problem faced by outsiders may be exacerbated by firm diversification.

This dissertation examines the relationship between firm diversification and asymmetric information in three contexts. First, we examine the effect of corporate diversification on the equity issue process. In a sample of 641 seasoned equity issues conducted over the 1983-1994 time period, we find evidence that equity issues by diversified firms are viewed less negatively by the market than are equity issues by comparable focused firms. This finding is consistent with the hypothesis that diversification helps alleviate the asymmetric information problem when raising equity. Our results are inconsistent with the hypothesis that valuation problems exacerbate the asymmetric information problem for diversified firms. Additionally, our results appear to be inconsistent with the hypothesis that the market views equity issues by diversified firms as a particularly strong indication that the firm will invest in poor projects.

Second, we examine the effect of corporate diversification on analyst following, accuracy and dispersion of analysts' forecasts, and abnormal returns associated with earnings announcements. In a sample of 12,282 firm-years over the 1985-1995 period, we find evidence that, relative to focused firms, diversified firms have: (i) smaller analyst followings, (ii) more accurate analyst forecasts, (iii) less disagreement among analysts, and (iv) smaller revaluations associated with earnings announcements. These findings are also consistent with the hypothesis that firm diversification helps alleviate asymmetric information.

Finally, we explore the impact of firm diversification on bid-ask spreads, adverse selection components of bid-ask spreads, and turnover. The aggregate nature of diversified firms' disclosures might allow for valuable private information to exist about divisions. The presence of differentially informed investors may result in less liquid markets and higher bid-ask spreads (and larger adverse selection components of spreads). Alternatively, while diversified firms may be less transparent than focused firms, this opacity may not result in greater adverse selection for market makers. Firm diversification reduces the volatility of returns and, hence, may make outsiders' expectations more accurate. Thus, the value of private information may be smaller for diversified firms since the potential for misvaluation of the firm by uninformed outsiders is smaller. In a sample of 3,629 firm-years over the 1993-1995 period, we find that, relative to focused firms, diversified firms have: (i) similar bid-ask spreads, (ii) similar adverse selection components, and (iii) lower turnover. These findings are consistent with hypothesis that firm diversification does not strictly exacerbate asymmetric information.

CHAPTER 2
EVIDENCE FROM EQUITY OFFERINGS

Introduction

A large and growing literature examines the consequences of corporate diversification. A striking empirical finding in this literature is that diversified firms, on average, sell at a discount relative to focused firms.[1] The evidence also indicates that a firm's stock price tends to fall when a firm announces a focus decreasing corporate action, and tends to rise when a firm announces a focus increasing action.[2] While corporate diversification may have both costs and benefits, the evidence suggests that on average the costs exceed the benefits.

While for many firms the costs of diversification may exceed the benefits, there appears to be considerable heterogeneity across firms in these costs and benefits. For example, Denis, Denis, and Sarin (1997a) report that 40% of the multiple business segment firms they examine actually trade at a premium relative to the sum of their

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[1] See Wernerfelt and Montgomery (1988), Lang and Stulz (1994), Berger and Ofek (1995), and Servaes (1996). Maksimovic and Phillips (1998) present evidence suggesting that the negative correlation between firm value and diversification does not represent a causal relationship.

[2] Morck, Shleifer, and Vishny (1990) report that diversifying acquisitions are viewed more negatively by the market than are other acquisitions, while John and Ofek (1995) report that focus increasing asset sales result in a more positive market reaction than non-focus increasing sales. Comment and Jarrell (1995) report that measures of a firm's annual change in focus are correlated with changes in the firm's market value.

segments' imputed stand-alone values. Thus, a blanket recommendation that all firms should choose a focused organizational form appears unwarranted.[3] This suggests that an important research issue is to identify the costs and benefits associated with diversification, as well as the situations in which the costs of diversification are likely to exceed the benefits and vice versa.[4]

Recent papers by Rajan, Servaes, and Zingales (1997) and Scharfstein (1998) attempt to identify some of the costs of diversification by examining the investment patterns of diversified firms. Both papers present evidence of a cross-subsidization that results in weak divisions of conglomerate firms investing at higher levels than their stand alone industry peers. In addition, Rajan, Servaes, and Zingales (1997) report that the degree of cross-subsidization is correlated with the estimated diversification discount. This evidence suggests that the marginal dollar spent by a diversified firm is invested in relatively poorer projects than the marginal dollar invested by a focused firm.[5]

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[3] In fact, many firms have not embraced a return to focus. For the 500 largest U.S. public firms (which account for approximately 75% of domestic output), Montgomery (1994) reports that the average level of diversification actually increased between 1985 and 1992.

[4] Recent research based on historical comparisons (Matsusaka (1993), Hubbard and Palia (1997), and Klein (1998)) and international comparisons (Fauver, Houston, and Naranjo (1998)), suggests that there are situations where on average the benefits of diversification exceed the costs. Denis and Thothadri (1997) report that firms with either very high or very low levels of growth opportunities have the largest estimated diversification discounts.

[5] Rajan, Servaes, and Zingales (1997) and Scharfstein and Stein (1997) present models based on the internal dynamics of the firm that explain the cross-subsidization between divisions in a conglomerate. Shin and Stulz (1997) also discuss and present evidence consistent with an inefficient allocation of capital across investment projects in diversified firms.

There is little empirical work that directly identifies the benefits of diversification. Theoretical work by Lewellen (1971), Williamson (1975), and Stein (1997) suggests that there are potential financing benefits from forming a diversified firm. Lewellen (1971) argues that coinsurance effects increase a diversified firm's debt capacity relative to the aggregate debt capacity of its individual divisions as stand alone firms. However, Comment and Jarrell (1995) find little evidence that diversified firms use substantially more debt than focused firms. Williamson (1975) and Stein (1997) argue that there may be benefits of diversification associated with forming an internal capital market. Diversified firms can use the cash flow generated by divisions with poor investment opportunities to finance the investment projects of divisions with superior investment opportunities. Internal financing avoids the transaction costs and adverse selection costs associated with raising external capital. While Lamont (1997) and Shin and Stulz (1997) provide evidence of active internal capital markets, the previously cited evidence calls into question the efficiency of this internal capital allocation process.

In this paper, we provide evidence on the potential benefits and costs associated with corporate diversification by examining the effect of diversification on abnormal stock returns at the announcement of an equity issue. While previous theoretical work suggests that there are benefits of diversification associated with increased debt capacity and enhanced reliance on internal capital markets, we suggest here that another potential benefit of diversification is improved access to the market for external capital. In particular, we advance the possibility that the Myers and Majluf (1984) problem created by the presence of asymmetric information when issuing equity will often be less severe for diversified firms relative to focused firms.

Our argument is based on the assumption that the errors the market makes in valuing unrelated divisions of a firm are imperfectly correlated. This implies that the absolute value of the percentage error in the market's pricing of a firm's stock will generally be smaller in a diversified firm relative to a focused firm. Consequently, the adverse selection problem facing equity issuers is lessened for diversified firms compared to focused firms. Our argument is related to the models of Gorton and Pennacchi (1993) and Subrahmanyan (1991). Those authors argue that there are lower adverse selection costs associated with trading a basket of stocks as opposed to trading individual stocks, potentially explaining the growth of the market for index-linked securities. Since this adverse selection argument has not been widely recognized in a corporate diversification context and the arguments behind it are somewhat subtle, we present a simple signaling model which illustrates conditions under which diversification will reduce adverse selection for equity issuers.[6] We refer to the possibility that diversification lessens the Myers and Majluf (1984) problem and results in a relatively smaller negative reaction to equity issues as the *information diversification hypothesis*.

While the information diversification hypothesis predicts less negative equity issue announcement returns for diversified firms relative to focused firms, there are two alternative hypotheses that predict more negative announcement returns. One alternative is that diversified firms may be harder to value than focused firms. This possibility could arise if the accounting figures reported for focused firms are more informative than the accounting figures for diversified firms due to the aggregate nature of diversified firms' accounting reports.[7] Gilson, Healy, Noe, and Palepu (1997) and Krishnaswami and Subramaniam (1998) report evidence consistent with this hypothesis. They find that firms which spin-off business units experience an increase in analyst forecast accuracy after the spin-off. It is worth noting, however, that these results pertain to a self-selected group of firms that chose to become more focused. Diversified firms that do not suffer from this transparency problem should have less of an incentive to spin-off divisions. Nevertheless, if the accounting figures of diversified firms are less transparent relative to those of focused firms, it is possible that asymmetric information problems are more severe for diversified firms relative to focused firms. In the context of equity issues, this would worsen the adverse selection problem identified by Myers and Majluf (1984) and would result in a larger average negative reaction to the announcement of an equity issue for diversified firms compared to focused firms. We refer to this hypothesis as the *transparency hypothesis*.

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[6] Our model illustrates that there are situations where diversification can actually exacerbate the Myers and Majluf (1984) underinvestment problem. We argue below, however, that the most likely outcome is a mitigation of the problem.

A second hypothesis predicting a more negative market reaction to equity issues by multiple division firms relative to focused firms centers around how firms will use the funds raised from an equity issue. One frequent explanation for the negative reactions to some firms' equity issue announcements is that an equity issue signals that the firms' managers intend to spend the funds raised on negative NPV projects. Jung, Kim, and Stulz (1996) report evidence that they argue is consistent with this hypothesis. They find that the most negative market reactions to equity issues occur for firms with the worst investment opportunities. An extension of this hypothesis would suggest that equity issues by diversified firms may be viewed more negatively than equity issues by focused firms. In particular, we would expect to observe larger negative reactions to equity issues for diversified firms if they have a greater propensity to invest inefficiently because of cross-subsidization problems or a relatively greater propensity to engage in excessive levels of "empire building."[8] We refer to the possibility that the market views equity issues by diversified firms as a more likely signal of spending on poor projects compared to focused firms as the *inefficient investment hypothesis*.

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[7] As long as segment level reporting leaves managers with some discretion over cost allocations, it may be difficult for the market to accurately attribute earnings changes to a firm's different segments. This may result in larger average errors in the market's assessment of a multiple segment firm's value compared to a single segment firm. There is a large accounting literature concerning the informativeness of segment level accounting reports (e.g., Kinney (1971), Collins and Simonds (1979)). Transparency considerations play an important role in Nanda and Narayanan's (1997) model of optimal corporate scope.

To examine the empirical relevance of these three hypotheses, we construct a sample of 641 seasoned equity offerings over the period 1983-1994. We find that the market reaction to equity issue announcements is less negative for diversified firms compared to focused firms. These results hold even after we control for other factors that may affect the market reaction to equity issues. Taken as a whole, our results appear to be consistent with the information diversification hypothesis and inconsistent with the transparency and inefficient investment hypotheses. Thus, our results support the existence of a previously unidentified financing benefit associated with corporate diversification.

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[8] The evidence reported by Denis, Denis, and Sarin (1997b) is consistent with the hypothesis that managers of diversified firms tend to have weaker incentives to maximize shareholder value. Weak incentives may lead to higher levels of overinvestment.

The rest of the paper is organized as follows. The next section, A Model of Diversification and Equity Issues, contains a model of the effects of diversification on the Myers and Majluf (1984) underinvestment problem and the relevant implications with regards to the market reaction to equity issues.[9] In the section, Data and Empirical Design, we describe our sample. The last two sections contain the empirical results and a concluding discussion.

A Model of Diversification and Equity Issues

In this section we present a simple model of equity financing under asymmetric information in a framework similar to Myers and Majluf (1984). Our goal is to show how diversified firms compare to focused firms when choosing whether to issue equity.

Basic Setup

A firm is composed of two divisions which we refer to as division A and division B. The assets in place for division A (B) have a high value of A_H (B_H) with probability p_h (q_h), and they have a low value of A_L (B_L) with probability $1-p_h$ ($1-q_h$). We refer to a division with a high (low) value of assets in place as a high type (low type) division. We assume that the manager of the firm knows the type of each division, but the market is only aware of the probability distribution of division types. Finally, we assume that the probability that division A is a high type or a low type is independent of the probability that division B is a high type or a low type. This is a natural assumption if the errors the market makes in valuing each of the two divisions are independent.[10] In the following discussion we adopt the notation $\overline{A} = p_h A_H + (1-p_h)A_L$ and $\Delta A = A_H - A_L$. Similar notation is used for division B.

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[9] This model was developed with Charles Hadlock of Michigan State University. The model is included in the dissertation to provide a cohesive framework for discussion. The dissertation committee believes the material reflects a sufficient level of original and scholarly work by the author to merit inclusion in the dissertation.

At any point in time the firm has at most one investment project, and, when an investment project arrives, it must be funded immediately or else it disappears.[11] Investment projects require an expenditure of I and yield a gross return of $\tilde{r}I$ where $\tilde{r} > 1$. There is no discounting, and thus the NPV of the project is rI where $r = \tilde{r} - 1$. The presence of an investment project and all of the model parameters are common knowledge. We make the standard assumption that the firm's managers act in the best interest of existing shareholders when making their financing decision.

Stand Alone Division Financing

For comparison purposes, we first consider the case where the two divisions are stand alone firms. Suppose division A is the division with the investment project. As a stand alone firm, division A will be subject to the asymmetric information problems described by the Myers and Majluf (1984) model. Using standard analysis, a pooling outcome where both the high type and low type issue equity and invest will be an equilibrium if and only if[12]

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[10] We make the assumption of independence for simplicity. As long as the division types are not perfectly correlated similar results to those we report below will hold.

[11] More generally we might expect that at times both divisions have an investment project so that the firm has two projects. The basic effects we illustrate below also appear under this type of scenario, but the analysis is significantly more complicated since investment games that include the possibility of choosing the investment level can be quite complicated. The assumption that projects disappear allows us to abstract from the complicated issue of waiting to invest in the future which is discussed by Lucas and McDonald (1990).

$$r \geq \frac{(1 - p_h)\Delta A}{\overline{A} + \tilde{r} I}. \tag{1}$$

We refer to the left side of (1) as the *profit rate* of the investment project, and the right side of (1) as the *mispricing rate* of equity finance for division A. Good types will be willing to issue equity and invest only when the profit rate of a project exceeds the mispricing rate.

The term $\tilde{r}I$ in the denominator of the right side of (1) will typically be quite small relative to $\overline{A}$. Since the derivations and intuition for what follows are much more transparent if we set this term equal to 0, we will make this substitution and note that the results we report below can be interpreted as being approximately true for sufficiently small projects. As we argue in the appendix, for practical purposes the restriction to small projects is unlikely to affect the empirical content of the results. With this substitution, we can denote the mispricing rate of division A as M_A where $M_A = [(1 - p_h)\Delta A]/\overline{A}$. The pooling equilibrium will obtain for division A when the inequality $r > M_A$ holds. In this equilibrium, the market reaction to equity issues will be 0. When the inequality does not hold, a separating equilibrium will be the unique equilibrium and the market reaction to an equity issue will be $-p_h \Delta A / \overline{A}$ which is negative. For later purposes, we note here that the corresponding mispricing rate for division B will be written as M_B where $M_B = [(1 - q_h)\Delta B]/\overline{B}$.

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[12] The derivations here are standard. See for example Daniel and Titman (1995).

Diversified Firm Financing

We now return to the case where divisions A and B are the two divisions of a single conglomerate firm. If division A has an investment project, the firm must decide whether to pass up the project or issue equity to raise the necessary investment funds.[13] Since each division can be one of two types, the diversified firm can be any one of four types. We describe these types as an ordered pair where the first member of the pair is the type of division A and the second member of the pair is the type of division B. We will call (H,H) the best conglomerate type and (L,L) the worst conglomerate type.

The most efficient scenario from an ex ante perspective is a complete pooling outcome where all four conglomerate types invest when a project arrives. We call this outcome the *total pooling outcome*. The total pooling outcome is an equilibrium as long as the best conglomerate type (i.e., type (H,H)) is willing to issue equity to invest whenever all other types do the same. For a project with a profit rate r the total pooling outcome is an equilibrium whenever[14]

$$r \geq \frac{(1-p_h)\Delta A + (1-q_h)\Delta B}{\overline{A} + \overline{B}}. \tag{2}$$

We refer to the right side of (2) as the conglomerate *total pooling mispricing rate* and denote it by M_4. This mispricing rate is a weighted average of the mispricing rates of the two divisions (i.e., M_A and M_B), where the weights are proportional to the relative sizes of each division (i.e., $\overline{A}$ compared to $\overline{B}$).

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[13] In our model the firm's organizational form is fixed and then information arrives and financing/investment decisions are made. This contrasts with Nanda's (1991) model of equity carve outs where information arrives and then a decision related to organizational form is made.

[14] The derivation of this inequality proceeds along the same lines as in the stand alone case and is omitted. Note that again we are assuming the project is small and thus have omitted the gross returns from investment in the denominator of the right side of (2). We make this omission again in our derivation of inequality (3) below.

Equation (2) suggests that changing division A from a stand alone entity to a division of a conglomerate probably has, on average, a neutral impact on achieving a pooling equilibrium in which desirable investment projects are financed through an equity issue. To see why, note that the project is taken if its profit rate *r* exceeds the weighted average mispricing rate of divisions A and B. *A priori*, there is no reason to believe that in a conglomerate setting the typical mispricing rate of division A is greater than or less than the mispricing rate of division B.

The most we can say is that putting two divisions together in a single firm can either raise or lower the likelihood of a pooling equilibrium where all types issue stock.

To illustrate this point, we construct an example where putting two divisions together into a single firm strictly worsens the asymmetric information problem. Suppose that the two divisions are of equal size (i.e., $\overline{A} = \overline{B}$), and that M_A=.03 while M_B=.07. If an investment project has a profit rate of *r*=.04, then as a stand alone firm division A will issue equity and invest in this project with a probability of 1. However, if the two divisions are merged into a conglomerate firm, then the relevant mispricing rate will become $M_4 = (M_A + M_B)/2 = .05$, and the project will be funded with a probability less than 1. Note that in this example the market reaction to an equity issue by a stand alone division A would be 0, while an equity issue by a conglomerate would be met with a negative reaction.

While in this example diversification exacerbates the asymmetric information problem, it is straightforward to construct an alternative example where diversification alleviates the problem. For instance, if we set M_A=.07, M_B=.03, and r = .06, division A as a stand alone firm would only take the project if it were a low type. If, however, A and B are merged into a conglomerate, the project would always be taken regardless of type. We note here that when M_A=M_B, the likelihood of observing a pooling equilibrium where all types issue equity is unaffected by whether A is a stand alone firm or a division of a conglomerate merged with B.

Given the likelihood that mispricing rates across conglomerate divisions are similar on average, we are skeptical that diversification will on average impact the likelihood of observing a pooling equilibrium where all types issue equity. However, there is a separate channel, quite distinct from the averaging of mispricing rates, by which diversification can impact the asymmetric information problem. *A priori* we believe that this channel will result in an average net benefit to diversification when issuing equity in the presence of asymmetric information. To illustrate this possibility in the simplest context, we examine the special case where division B is a scaled up version of division A. Specifically, we assume throughout the rest of the modeling that B_H=λA_H and B_L=λA_L where $\lambda \geq 1$. Additionally, we assume throughout that $p_h = q_h$ and we use x to denote this common probability. Our assumptions immediately imply that $M_A = M_B = M_4$. In what follows, we consider the financing of an investment project with a profit rate r that is less than these mispricing rates, that is $r < M_A = M_B = M_4$. An immediate implication of these assumptions is that the stand alone divisions and the conglomerate firm will fund this project with a probability less than 1. This illustrates that if you merge together two divisions with substantial asymmetric information problems, one cannot hope to achieve a completely efficient investment policy. While diversification may not produce miracles, we now show that it can often mitigate the consequences of asymmetric information.

The Information Diversification Effect

For a conglomerate with an investment project, there are four outcomes that are possible pure strategy equilibria.[15] One of these is the total pooling outcome discussed above. The other potential equilibrium outcomes are: (A) An outcome where all but the best conglomerate type will issue equity. We will call this the three pooling outcome. (B) An outcome where the two worst types (i.e., types (L,L) and (H,L)) issue equity. We will call this the two pooling outcome. (C) An outcome where only the worst conglomerate type (i.e., type (L,L)) issues equity. We will call this the singleton outcome. Given our maintained assumptions, our discussion above establishes that the total pooling outcome is not an equilibrium. Clearly, from an ex ante perspective, the three pooling outcome is more efficient than the two pooling outcome which is more efficient than the singleton outcome. In addition, the three pooling outcome will generate the least negative reaction to equity issues and the singleton outcome will generate the most negative reaction. We discuss conditions under which these different outcomes are equilibria. For reasons we discuss below, we focus primarily on the three pooling outcome.

Three pooling outcome. The three pooling outcome will be an equilibrium if and only if type (L,H) is willing to issue equity and pool with the lower value types (L,L) and (H,L). This occurs if and only if

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[15] Note that it is possible that multiple equilibria exist. We implicitly assume that when this occurs the empirically relevant equilibrium is the one with the highest level of investment (i.e., the most efficient equilibrium).

$$r \geq \frac{(A_L + B_H) - E(A + B \mid conglomera\ te\ type\ \ is\ not\ (H,H)\ )}{E(A + B \mid conglomera\ te\ type\ \ is\ not\ (H,H)\ )}. \tag{3}$$

We will refer to the right side of (3) as M_3. Since we are considering an investment project with a profit rate of *r* where $r < M_A = M_B = M_4$, a necessary condition for the three pooling outcome to be an equilibrium is that $M_3 < M_4$. The following proposition establishes that this inequality will hold when *x* is not too large. The proof of the proposition is presented in the appendix.

Proposition: For any A_L, A_H, and $\lambda \geq 1$ there exists an $\bar{x} \leq 1$ such that $M_3 < M_4$ if and only if $x < \bar{x}$. Furthermore $d\bar{x}/d\lambda < 0$ and $\bar{x} = 1$ when $\lambda = 1$.

In words, this proposition says that as long as the probability that a division is a high type is not too large (i.e., *x* not too large), then it is easier to pool the three lower firm types together rather than all four firm types. The more symmetric the divisions are in the sense that λ is close to 1, the larger the range of *x* values for which $M_3 < M_4$. If A and B are of the same size (i.e., λ =1), then it is always the case that pooling the three firm types together will be more likely than total pooling. We note here that many measures of diversification, for example the Herfindahl indices used by Comment and Jarrell (1995), will tend to indicate higher levels of diversification the more symmetric are the sizes of the divisions of a firm.

The possibility that diversification lessens the asymmetric information problem can be illustrated using the proposition. The proposition shows that for many parameter values it will be the case that $M_3 < M_4$, and in addition it indicates that this inequality is particularly likely to hold when λ is close to 1. Consider a set of parameters identified by the proposition where $M_3 < M_4$ and an investment project with a profit rate of *r* where M_3

$< r < M_4$. If the divisions are stand alone firms, there will be a separating equilibrium and the project will be funded only when a division is a low type, an event that occurs with probability 1-x. In a conglomerate, the project will be funded as long as the firm is not of type (H,H), and, consequently, funding occurs with probability $1-x^2$. We show in the appendix that for the conglomerate the market reaction to an equity issue will be $-(x^2/1+x)\Delta A/\overline{A}$, which is less negative than the reaction $-x\Delta A/\overline{A} = -x\Delta B/\overline{B}$ for the stand alone divisions when they issue equity.

We present here a simple numerical example that illustrates the observations reported above for two equal sized divisions. Suppose A_H=B_H=103, A_L=B_L=97, and p_h=q_h=x=.5. We consider a small investment project with a profit rate r of .02.[16] It can be easily verified that the separating equilibrium is the unique equilibrium for the stand alone divisions, and the market reaction to equity issues by stand alone firms will be (97-100)/100 or –3%. In a conglomerate, types (H,L) and (L,H) both have assets in place worth 200, while type (L,L) has assets in place worth 194. The conditional expected value of assets in place given that the conglomerate is one of the three lower value types is (1/3) x 194 + (2/3) x 200 = 198. Using this data, M_3 = (200 – 198)/198 = .0101. Since r =.02 > .0101 = M_3, we conclude that inequality (3) holds and the three pooling outcome is an equilibrium. Additionally, we note that for the conglomerate the market reaction to an equity issue will be (198-200)/200 = -1%.

Two pooling outcome. The most important results concerning how diversification lessens the asymmetric information problem are described in the three pooling outcome case above. When the two divisions are of equal size (λ=1), the two pooling outcome is clearly never an equilibrium because the types (L,H) and (H,L) have the same value of assets in place. When the two divisions are of similar size (i.e., λ close to 1), for most parameter values if the three pooling outcome is not an equilibrium then the two pooling outcome will also not be an equilibrium. Thus, we do not specifically discuss when the two pooling outcome is an equilibrium. We do note that in the two pooling outcome equilibrium types (L,L) and (H,L) invest, and a project is financed with probability 1-x. This is equal to the probability of financing for the stand alone divisions. We show in the appendix that the market reaction to equity issues in the two pooling outcome equilibrium will be less negative than the market reaction to equity issues by stand alone divisions. However, this difference in the market reaction to equity issues will be largest when λ is closer to one, which as we noted above is when the two pooling outcome is unlikely to be the observed equilibrium outcome.

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[16] The qualitative results in this example still hold for substantial sized projects. If we use the median figure reported by Jung, Kim, and Stulz (1996) and assume that $I = .13\overline{A}$ the qualitative results of the example are unchanged.

Singleton outcome. When the other potential equilibrium outcomes are not equilibria, the singleton outcome will be the unique equilibrium. This will occur when r is very small or when the divisions have severe asymmetric information problems and all of the mispricing rates corresponding to the other potential equilibrium outcomes are quite high. When the singleton outcome is the unique equilibrium, the conglomerate will invest in a project with probability $(1-x)^2$ This is actually lower than the probability that a stand alone division invests in the project (i.e., 1-x), and illustrates again that diversification can exacerbate the asymmetric information problem. In the singleton outcome equilibrium, the asymmetric information problem is so severe that when either one of the two divisions is a good type the conglomerate is unwilling to pool with the worst conglomerate type (L,L). It is straightforward to show, however, that in this equilibrium the negative market reaction to an equity issue by conglomerates is the same as for the stand alone divisions.

Empirical Implications

Our model illustrates that a firm's corporate structure may interact with the Myers and Majluf (1984) asymmetric information problem with regards to equity financing. In particular, the model demonstrates that diversification may lessen the asymmetric information problem associated with issuing equity in the sense that diversified firms will be able to pursue a more efficient investment policy than focused firms. We call this possibility the information diversification hypothesis. An empirical implication of this hypothesis is that the market reaction to equity issues by diversified firms should be less negative than the reaction to issues by focused firms.[17] Additionally, our results indicate that the level of diversification as measured by the symmetry in size of a firm's different divisions should exhibit a positive correlation with equity issue announcement abnormal returns.

In the introduction, we discussed an alternative way in which diversification can actually worsen the asymmetric information problem associated with issuing equity. We referred to this possibility as the transparency hypothesis. The argument behind the transparency hypothesis is that when stand alone divisions are merged into a conglomerate the individual divisions become more difficult for the market to value owing to the arbitrary nature of division level accounting. In the terminology of the model, the transparency hypothesis suggests that the dispersion between the value of a high type division and a low type division may be larger for divisions of a conglomerate compared to when they are stand alone firms. The transparency hypothesis suggests that diversification can in fact exacerbate the asymmetric information problem. If this occurs, we expect to observe a more negative market reaction to equity issues for diversified firms compared to focused firms.

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[17] An alternative possibility that is similar in spirit to our information diversification argument is that diversified firms may be better able to time their equity issues compared to focused firms (see Lucas and MacDonald (1990), Korajczyk, Lucas, and McDonald (1991), and Choe, Masulis, and Nanda (1993) for equity issue timing models). For example, it is possible that the availability of internal cash flow allows a diversified firm to delay issuing equity until a point in time that asymmetric information problems are minimal. The economic and empirical implications of this timing argument are very similar to the information diversification effect that we model. In particular, both arguments imply a more efficient investment policy for diversified firms and a less negative market reaction to equity issues.

Data and Empirical Design

Description of Sample

We draw our initial sample from the set of all seasoned equity offerings (SEOs) reported in Securities Data Corporation's (SDC) new issues database conducted by firms that appear on the Compustat tapes (research and active company files). We restricted our attention to offerings during the 1983-1994 time period conducted by entities other than commercial banks, thrifts, real estate investment trusts, closed end funds, and government agencies. Additionally we excluded issues conducted by regulated utilities (SIC codes between 4800-4829 and 4910-4949), operating firms that report a financial segment (segment SIC codes between 6000 and 6999), and issuers with total assets of less than $5 million.

To conduct a clean comparison, we consider only those issues conducted by multiple segment firms and single segment firms that operated in reasonably similar industries.[18] Our procedure for doing this was as follows. For each year in the sample, we first identified all of the distinct industries (3 digit SIC codes) of the segments of multiple segment firms that issued equity. For the same year, we then identified all of the single segment firms that issued equity and operated in one of these industries. Issues by single segment firms that were not in one of these industries were dropped from the sample. Additionally, we dropped from the sample issues by multiple segment firms if the issuer did not have at least one segment in the same industry as a single segment firm that issued equity during the same calendar year.[19] Thus, the final sample includes only issues made by multiple segment firms that had at least one segment with an industry counterpart among the set of single segment issuers during the same calendar year and only those issues by single segment issuers who comprise this set of counterparts.

A total of 912 equity issues remain after we impose these industry requirements. Of these 912 issues, 600 were conducted by single segment firms and 312 were conducted by multiple segment firms. The fact that single segment issues outnumber multiple segment issues suggests that single segment firms have a greater propensity to issue equity compared to multiple segment firms. To investigate this, we identified for

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[18] Interpreting results based on samples from very different industries is difficult. Suppose an industry with severe asymmetric information problems tends to attract multiple segment firms because this organizational form partially alleviates the asymmetric information problem. Given the high level of asymmetric information, one might observe comparatively large negative reactions to equity issues by these multiple segment firms. This could lead one to the false conclusion that diversification results in more negative market reactions to equity issue announcements.

[19] We make no attempt to match individual segments of single segment and multiple segment firms based on size or other characteristics. Thus, several single segment firms may be identified as industry counterparts for a particular segment of a multiple segment firm. Similarly, one single segment firm may be identified as the industry counterpart for several multiple segment firms.

each sample year the set of three digit industries that had an equity issuer in our sample in that year. We then calculate from the Compustat universe the total number of single segment and multiple segment firms that operated in at least one of those industries. Summing across years, there were 16,293 such single segment firm-years and 11,107 multiple segment firm-years. Thus, in the set of industry-years where there was an equity issue, single segment firms outnumber multiple segment firms by a ratio of 1.47 to 1. Since single segment firms outnumber multiple segment firms by a ratio of almost 2 to 1 in our sample of issues (600 vs. 312), this evidence suggests that single segment firms have a greater propensity to issue equity. If anything, this might bias against finding support for the information diversification hypothesis. To the extent that conglomerates are less likely to issue equity, perhaps due to a greater availability of internal financing, it could be argued that conglomerate offerings will be less anticipated by capital markets. This would result in more negative equity offering announcement returns.

From our sample of 912 equity issues, we excluded rights issues, unit offerings, and offerings which included no primary shares. For each of the remaining 812 issues, we searched Dow Jones News Service for the earliest reference to the offering. Announcement stories were unavailable for 24 issues, and the announcement articles for 97 issues had a confounding announcement (e.g., acquisition, divestiture, earnings, or concurrent debt issue). Of the 691 issues with clean announcements, 641 had the full data required from SDC, Compustat, and CRSP to conduct our analysis.[20] These 641

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[20] We required sample firms to have at least 185 days of returns data available on the CRSP daily tape over the period from 220 to 21 days preceding the announcement date. This resulted in a loss of 33 issues. An additional 17 issues were discarded because at least one required data item was unavailable.

SEOs conducted by 553 distinct issuers comprise the final sample. Of these 641 issues, there were 424 single segment issuers and 217 multiple segment issuers.

The frequency of issues by year and firm type is reported in Table 2-1. While the issues in our sample must satisfy the industry and size conditions outlined above, the distribution of issues over time for our sample generally corresponds with the distribution over time of all issues for the period 1983-1994. For example, the fraction of issues conducted in 1983 and 1993 represent approximately 20% and 14%, respectively, of the total number of issues conducted during the 1983-1994 period.[21] In our sample, the corresponding figures are 27% and 15%, respectively.

Empirical Methodology

We use event study methodology to estimate abnormal returns. For each issue we use the issuer's daily returns and the returns on the CRSP value weighted market index to estimate market model parameters over days -220 to -21 where day 0 is the announcement day of the issue. Previous papers (e.g., Asquith and Mullins (1986)) have documented that equity offerings generally follow a period of significantly positive abnormal returns. This runup could impart an upward bias in market model intercepts and a downward bias in our measure of abnormal returns if we use standard event study methodology to calculate abnormal returns. Therefore, in our calculation of daily abnormal returns we replace the estimated market model intercept with the risk-free rate multiplied by one minus the beta estimated from the market model. This amounts to a one factor model where the abnormal return for firm i on day t is calculated as

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[21] These percentages are calculated over the universe of all issues in the SDC database conducted by entities other than commercial banks, thrifts, REITs, closed end funds, and government agencies.

$$AR_{it} = R_{it}-(1-\beta_i)R_{ft}-\beta_i R_{mt}$$

where R_{it} is the return to firm i on day t, β_i is the estimated market model beta for firm i, R_{ft} is the daily risk free return proxied for by the monthly return on a 90 day Treasury Bill in the month of the announcement divided by the average number of trading days in the month, and R_{mt} is the return on the value weighted CRSP market index on day t. We calculate the abnormal return associated with an equity issue announcement as the sum of the abnormal returns over a two-day period that includes the day of the announcement and the day following the announcement.[22]

Variable Construction

In this section we describe the variables used in our analysis. Data on firm characteristics are collected from CRSP and Compustat while data on the offering characteristics are derived from the SDC database. All variables constructed from Compustat data are measured at the end of the fiscal year that precedes the announcement date of the equity offering.

To examine the relationship between diversification and the market reaction to an equity issue announcement, we calculate two measures of diversification. A coarse measure of diversification is a binary variable called MULTISEG which takes a value of 1 if a firm reports more than one segment and 0 otherwise. As a finer measure of diversification, we use an asset based Herfindahl index which we call HERF. This variable reflects the degree to which the assets of a firm are concentrated within its divisions. For each firm, HERF is calculated as the sum of the squares of each segment's assets as a proportion of the firm's total assets. Thus, for firm i in year t we measure HERF as

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[22] Announcement days are taken from wire services and not the Wall Street Journal. The results we report are not sensitive to using conventional market model prediction errors to generate abnormal returns.

$$\mathrm{HERF}_{it} = \sum_{j=1}^{N_{it}} \left(TA_{jit} \Big/ \sum_{j=1}^{N_{it}} TA_{jit} \right)^2 ,$$

where N_{it} is the number of segments of firm i at time t and TA_{jit} are the assets attributable to segment j of firm i at time t. HERF equals 1 for all single segment firms and is less than 1 for multiple segment firms, where smaller levels of HERF correspond to less concentration of assets among segments and greater diversification. The information diversification hypothesis modeled in the section "A Model of Diversification and Equity Issues" predicts a negative relationship between HERF and equity issue announcement abnormal returns. In contrast, the inefficient investment and transparency hypotheses predict a positive relation between HERF and equity issue announcement abnormal returns.

We include other variables in our analysis that may impact the market reaction to equity issue announcements. One such variable is the volatility of an issuer's common stock returns. A stock that experiences larger price movements in response to new information concerning the stock will tend to have greater return volatility. Hence, we expect that higher levels of volatility may proxy for larger differences between a manager's knowledge of a firm's value and the market's assessment of that value. This suggests that stocks with higher return volatility should have more negative equity issue announcement abnormal returns.[23] We measure stock return volatility as the standard deviation of the market model residuals over the period from 221 to 21 days preceding the issue announcement. We call this variable VOLATILITY.

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[23] Existing evidence on the relationship between stock return volatility and equity issue announcement returns is generally mixed. Dierkens (1991) reports that more volatile stocks have significantly more negative returns while Denis (1994) reports the opposite result. Jung, Kim and Stulz (1996) find that more volatile stocks have more negative event day returns, but this effect is statistically insignificant in their sample.

Note that the VOLATILITY variable could proxy for the information diversification effect modeled in the section "A Model of Diversification and Equity Issues." The model illustrates how diversification can effectively reduce asymmetric information when issuing equity. Previous research suggests that diversification reduces stock return volatility (e.g., Comment and Jarrell (1995)). Hence, it is likely that a reduction in asymmetric information caused by the information diversification effect will also show up as reduced stock return volatility. We will have more to say on this point in the "Results" section of this chapter.

The other variables we use in our analysis to explain abnormal issuer returns are standard in the literature. Since firm size may be related to asymmetric information, we include the variable MVE which is the market value of an issuer's equity at the end of the calendar year preceding the announcement date. Since larger issues may be interpreted as particularly bad signals about a firm's value (e.g., Krasker (1986)), we include the variable PROC which is the gross proceeds from the offering calculated as the number of primary shares sold times the offer price.[24]

Asquith and Mullins (1986) and Masulis and Korwar (1986) have documented that combination offerings of both secondary and primary shares generally result in larger negative market reactions than non-combination offerings. This is consistent with equity sales by knowledgeable investors being negative signals regarding a firm's future prospects. Consequently, we include the binary variable SECDUM which equals 1 if an offer contains any shares sold by parties other than the firm and equals 0 otherwise.

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[24] Masulis and Korwar (1986) and Eckbo and Masulis (1992) have documented a negative relationship between gross proceeds and issuer abnormal returns. When we collapse MVE and PROC into a single variable by dividing proceeds by the market value of equity, the estimated coefficients on all of the other variables are qualitatively unchanged.

We also include in our analysis the issuer's market-to-book ratio which is intended to proxy for a firm's investment opportunities. This variable, MB, is defined as the ratio of the firm's market value (market value of equity plus the book value of total assets minus the book value of equity) to the firm's book value of total assets. Jung, Kim, and Stulz (1996) find that firms with higher market-to-book ratios experience more positive equity issue announcement abnormal returns. There are several reasons why high market-to-book firms may experience more positive abnormal returns. First, the market may be concerned that managers of low market-to-book firms may invest the money in poor projects. Additionally, high market-to-book firms may have particularly promising projects which they are unwilling to forego and which are difficult to finance with debt given the firm's need to maintain financial flexibility for the future. This could result in an outcome where all high market-to-book firms issue equity regardless of management's private information. This would result in the market reacting less negatively to the issue announcement.

Following Lucas and McDonald (1990) and Asquith and Mullins (1986), we also include in our analysis the variable RUNUP which is defined as the net-of-market, buy-and-hold return on the firm's stock for the period from 205 to 6 days preceding the announcement. RUNUP may reflect information about the firm's investment opportunities that is not reflected in MB. In particular, RUNUP should reflect the market's enthusiasm for a firm's prospects in the period immediately preceding an issue.

The final set of variables we include are related to the predictability of an equity issue. These variables are motivated by Bayless and Chaplinsky (1991) who report that firms which are more likely to issue equity (rather than debt) receive a less negative market response to the announcement of an equity issue. One way to view this result is that the market does not infer an equity issuer's stock is overvalued if the firm has a plausible economic rationale for choosing equity rather than debt. We expect that firms with greater financial flexibility are less likely to be viewed as having a credible need to issue equity. This includes firms with lots of cash on hand, firms that pay a dividend, and firms with low levels of financial leverage. To take this argument into account we include three additional variables in our analysis. CASHTA is the ratio of cash and short-term investments to total assets, DIVYES is a binary variable that equals 1 for firms that paid cash dividends in the previous year and equals 0 otherwise, and LEVG is the ratio of long-term debt and debt in current liabilities to total assets.[25]

Results

Univariate Comparisons

In Table 2-2, we report descriptive statistics grouped by whether the issuer was a single segment or multiple segment firm. The mean abnormal return associated with an SEO announcement is -2.24 percent for multiple segment firms and -2.82 percent for single segment firms. While the mean abnormal return for issues by multiple segment firms is less negative than for issues by single segment firms, the difference is not

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[25] In the four cases where leverage is greater than 1 we set LEVG equal to 1.

statistically different from zero at the 10% significance level (t=-1.50). The median abnormal return for issues by multiple segment firms is also less negative (-2.48%) than for issues by single segment firms (-3.04%), and this difference is significant at the 5% level. While the results here are suggestive, a simple division of the sample into multiple segment firms and single segment firms ignores a great deal of information about the degree of diversification of the multiple segment firms. Thus, in our multivariate analysis below we use the variable HERF as our measure of diversification.

It is clear from the descriptive statistics that multiple segment issuers differ in many ways from single segment issuers. Relative to single segment issuers, the multiple segment issuers in our sample have lower levels of systematic and unsystematic risk as measured by BETA and VOLATILITY. Additionally, the stock price run-up prior to an issue is larger for single segment issuers compared to multiple segment issuers. On average, multiple segment issuers hold less cash, have higher debt levels, and are more likely to pay cash dividends. Multiple segment firms are also larger and tend to make larger issues. Issues by single segment firms are more likely to include some secondary shares.

The single segment issuers in our sample have significantly higher market-to-book ratios than the multiple segment issuers. This is consistent with results in the diversification literature showing that diversified firms sell at a discount relative to focused firms. However, it is important to note that our sample is quite different from the samples in these previous studies since we are examining a set of firms that have chosen to sell equity. Presumably, these firms have better investment opportunities than a typical sample of firms.

To further investigate this point, we compute the market-to-book ratio that each firm sells at relative to a portfolio of comparable stand alone firms. We call this variable RELATIVEQ and it is calculated following the methodology of Berger and Ofek (1995).[26] As reported in Table 2-2, it does not appear that the multiple segment firms in our sample sell at a substantial discount relative to the sum of their segments' imputed values. The mean of RELATIVEQ for multiple segment firms is slightly positive (2%), while the median is slightly negative (-4%). As a comparison, Billett and Mauer (1998) report that multiple segment firms in their sample trade at a mean relative q of –4.7% and a median relative q of -6.0%. For single segment issuers in our sample the mean and median levels of RELATIVEQ are significantly positive (20% and 14%, respectively). Thus, it appears that multiple segment issuers in our sample sell at approximately their imputed stand alone values on average, while single segment issuers sell at a premium relative to the imputed values of industry counterparts. It is interesting to note that because the diversified firms in our sample are not substandard performers (i.e., average MB > 1 and average RELATIVEQ ≥ 0), the inefficient investment hypothesis seems less viable as a predictor of the market reaction to equity issues for the typical conglomerate firm.

A final variable we include in Table 2-2 is the gross underwriting spread for the issue divided by the issue price (GSPREAD). The figures in Table 2-2 indicate that multiple segment firms pay a slightly lower percentage gross spread than single segment firms (4.98% versus 5.27%), suggesting that the direct costs of raising equity capital are lower for diversified firms than for undiversified firms. In the section "Forecast Errors for Similarly Constructed Portfolios of Focused Firms," we present a multivariate analysis of underwriting costs which indicates that this relationship between diversification and underwriting costs is driven by differences in issue characteristics and stock return volatility between diversified and undiversified firms.

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[26] RELATIVEQ is the natural logarithm of the ratio of actual market-to-book to imputed market-to-book. We follow Berger and Ofek's (1995) methodology using asset multipliers to calculate the imputed stand alone market-to-book ratio of a firm.

Regression Results

As we noted previously, a simple comparison of mean abnormal returns for single segment and multiple segment firms is inadequate to assess our various hypotheses. In particular, the information diversification hypothesis suggests that abnormal returns should be affected by the degree of diversification, which we capture using the asset based Herfindahl index, HERF. The weighted-least squares regression results using HERF to explain equity issue announcement abnormal returns are reported Table 2-3. Since there is some intertemporal clustering of our data, all regressions in this table include year dummy variables to control for the possibility of "hot and cold" markets for equity issues (see Bayless and Chaplisky (1996)). In the first column of Table 2-3, the only explanatory variable, besides year dummies, is HERF. The coefficient on HERF is negative and highly significant ($t = -2.94$). Since increases in HERF represent increases in focus, it appears that equity issue announcements by more focused firms elicit more negative market reactions.

The above result is consistent with the information diversification hypothesis. The result also appears to be inconsistent with the inefficient investment hypothesis and the transparency hypothesis. This interpretation, however, should include a note of caution. These hypotheses are not mutually exclusive. For instance, diversification may mitigate the adverse selection problem associated with equity issues, while at the same time the investment funds raised by diversified firms may be invested less wisely than the funds raised by more focused firms. A more cautious interpretation of the negative coefficient on HERF is that the information diversification hypothesis dominates the alternative hypotheses in terms of net effects on issuer abnormal returns.

Given the correlation between diversification and other firm characteristics that we document in Table 2-2, inferences based on this initial regression may be premature. Some of the characteristics associated with diversification are known to lower the abnormal return associated with an equity issue, while other characteristics are known to raise the abnormal return. In column 2 of Table 2-3, we include additional variables that may affect abnormal returns. These include the size of the issue and issuer, the sale of shares in the offer by parties other than the firm, and various measures of a firm's financial positions and policies. The coefficients on the control variables are consistent with our expectations. In particular, the coefficients imply that more levered firms and larger firms experience less negative abnormal returns, while larger issues and issues that include sales by insiders result in more negative abnormal returns. Most importantly, the coefficient on HERF remains negative and significant (t = -2.25).

In column 3 of Table 2-3, we include the pre-issue price appreciation variable, RUNUP, and the natural log of the market-to-book variable, ln(MB). We expect these variables to be positively related to a firm's investment opportunities. Note that to the extent that diversification causes a lower market-to-book ratio, a positive coefficient on ln(MB) could be viewed as indirect evidence potentially consistent with the inefficient investment hypothesis. While the coefficients on RUNUP and ln(MB) are both positive, neither is significant at conventional levels. Again, the coefficient on the diversification variable HERF remains negative and significant ($t = -2.56$).

In column 4 of Table 2-3, we include the VOLATILITY variable. The coefficient on this variable is negative and highly significant ($t = -4.88$). Thus, it appears that firms with more stock return variability experience more negative abnormal returns when they announce an equity issue. This is consistent with the hypothesis that asymmetric information problems are more severe for firms with highly volatile stocks. The coefficient on HERF in this specification falls in magnitude, though it remains negative and significant at the 5% level ($t=-1.96$). This change in the coefficient on HERF is not too surprising. VOLATILITY should proxy for the degree of asymmetric information facing an issuer.[27] In the extreme case where VOLATILITY perfectly measures the level of asymmetric information, we would expect HERF to have no explanatory power at all. This would occur because the variable VOLATILITY would capture all factors affecting asymmetric information, including the impact of diversification on asymmetric information. The estimates in column 4 are consistent with the hypothesis that VOLATILITY and HERF are both noisy measures of asymmetric information. Given the positive correlation between VOLATILITY and HERF, which we would expect if both partially proxy for asymmetric information, we interpret the results in column 4 as adding further support to the information diversification hypothesis.

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[27] Dierkens (1991) discusses how volatility may proxy for the degree of asymmetric information. If volatility measures the degree to which a firm's value is affected by releases of new information, we would expect the informational advantage possessed by insiders to be larger for more volatile stocks.

In the specification where we include the volatility variable (column 4), the coefficients on RUNUP and ln(MB) become significantly positive. The positive coefficient on market-to-book is consistent with the results reported by Jung, Kim, and Stulz (1996). Again, if diversification causes a lower market-to-book-ratio, this could be interpreted as modest indirect support for the inefficient investment hypothesis. Nevertheless, the net effect of diversification is clearly an increase in abnormal returns following equity issue announcements.

Robustness Checks

To check the robustness of our results, we experimented with using the Caves, Porter, and Spence (1980) concentric index measure of corporate diversification instead of HERF. This index captures the degree to which the activities of a firm's divisions are related. Results using this variable were very similar to the results we report in the tables. We also considered specifications where we added the diversification discount variable (RELATIVEQ) to our regression specifications as a substitute for, and in addition to, the market-to-book variable (ln(MB)). In all cases the coefficient on RELATIVEQ was insignificant and small in magnitude, while the coefficient on HERF was essentially unchanged. Finally, we included the number of days that elapsed between the most recent previous quarterly earnings release and the SEO announcement (e.g., see Korajczyk, Lucas, and McDonald (1991)) and the number of analysts providing earnings forecasts for the firm in the prior fiscal year. Earnings release dates and analyst forecast data were collected from I/B/E/S.[28] Neither of these additional controls affected the reported results. In summary, our results appear robust to the inclusion of diversification discount control variables, differences in analyst coverage, relative timing of issues, and changes in our measure of diversification.

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[28] Where release dates in I/B/E/S were unavailable or unreliable, dates were obtained from a search of Dow Jones News Service. Firms not covered by I/B/E/S were assigned a zero for analyst coverage.

Determinants of Underwriting Spreads

While the primary goal of our paper is to understand the effect of diversification on the market reaction to equity issues, a related question concerns the effect of diversification on the direct costs associated with conducting an SEO. As discussed above, the figures in Table 2-2 indicate that multiple segment issuers have lower gross percentage underwriting spreads than single segment issuers. In column 1 of Table 2-4, we regress the gross percentage spread on our diversification variable HERF. The coefficient on HERF in this specification is positive and highly significant (t=4.78). This finding suggests that more diversified firms have lower direct underwriting costs.

The existing literature on underwriting costs has identified several factors that determine underwriting spreads.[29] In particular, larger dollar value issues tend to have lower percentage spreads because of economies of scale, while issues that are larger as a percentage of an issuer's pre-offer equity outstanding tend to have larger spreads. Additionally, issuers with more volatile stocks tend to pay higher spreads, presumably because of the increased risk borne by the investment banker. As we report in Table 2-2, issues by diversified firms tend to be for larger dollar amounts, and diversified firms tend to exhibit comparatively low stock return volatility. To examine whether the effect of diversification on percentage spreads is driven by the correlation between diversification and these other characteristics, we present some additional regression evidence in Table 2-4.

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[29] Eckbo and Masulis (1995) provide an overview of this literature.

In column 2 of Table 2-4, we include two variables related to the characteristics of the issue. Consistent with previous research, the estimates imply that larger dollar issues are associated with smaller spreads while larger issues as a fraction of the issuer's pre-offer equity outstanding are associated with larger spreads. With the inclusion of these additional variables, the coefficient on HERF decreases substantially in magnitude and is no longer significant. Thus, the differences in offer characteristics explain much of the difference in underwriting costs between diversified and focused firms.

In column 3 of Table 2-4, we add the issuer's stock return volatility as an additional explanatory variable. As expected, the coefficient on VOLATILITY is positive and highly significant (t=8.38). Furthermore, the coefficient on HERF in this specification is essentially zero. Thus, we conclude that diversification lowers spreads through its effect on issue and issuer characteristics. Since the issue characteristics are endogenous, it is not clear that the effect of diversification on these characteristics represents a benefit to diversification. However, the decrease in stock return volatility, an issuer characteristic associated with diversification, and the resulting lower percentage spread is more likely to represent a benefit of diversification.

Conclusion

In this paper, we examine the effect of corporate diversification on the equity issue process. We present a simple model that demonstrates how diversification can alleviate the Myers and Majluf (1984) problem created by the presence of asymmetric information when a firm issues equity. We call this potential benefit of diversification the information diversification hypothesis. In a sample of 641 equity issues conducted over the 1983-1994 time period, we find evidence that equity issues by diversified firms are viewed less negatively by the market than are equity issues by comparable focused firms. These findings are consistent with the information diversification hypothesis and suggest that there are financing benefits associated with corporate diversification.

The results we report cast doubt on some alternative hypotheses concerning the costs of diversification. One potential cost arising from corporate diversification is that agency problems within diversified firms result in a relatively inefficient investment policy for diversified firms compared to focused firms. Alternatively, diversified firms may tend to be run by managers who have a propensity to overinvest. If diversified firms tend to spend money on relatively poor projects and if the market views equity issues as an indication that a firm will invest in poor projects, we would expect the market to be particularly negative about the announcement that a diversified firm was seeking new equity finance. This possibility, which we term the inefficient investment hypothesis, is not consistent with our empirical findings. Additionally, our findings appear to be inconsistent with the hypothesis that diversified firms are less transparent than focused firms and that focused firms consequently face more severe asymmetric information problems when they approach the equity markets.

In interpreting our results with regards to the general issue of the costs and benefits of diversification, we offer a couple of concluding comments. With regards to the costs of diversification, several recent papers discuss the potential inefficient investment policies of diversified firms owing to agency problems within the firm. Given our results, it appears more likely that investment inefficiencies in diversified firms are driven by a misallocation of internally generated funds rather than a propensity to raise external funds for particularly poor projects. This observation is consistent with the findings of Lamont (1997), who provides evidence that diversified firms do not view internal and external funds as perfect substitutes.

With regard to the benefits of diversification, our results are consistent with the existence of financing benefits arising from diversification. While we have identified these benefits in the context of equity issues, our findings suggest the general result that asymmetric information problems are less severe for diversified firms. This information benefit arising from diversification could also prove advantageous in other external financing situations as well, e.g., debt contracting. It could also reduce the adverse selection components of bid-ask spreads and lead to greater liquidity for stocks and consequently lower costs of equity.

Table 2-1
Frequency of SEOs by Year and Issuer-Type for 641 Equity Issues During the Period 1983-1994

Year of Issue	Multiple Segment	Single Segment	Total	Percentage of Sample
1983	67	106	173	26.99%
1984	6	9	15	2.34%
1985	8	22	30	4.68%
1986	22	38	60	9.36%
1987	20	29	49	7.64%
1988	10	9	19	2.96%
1989	9	15	24	3.74%
1990	9	7	16	2.50%
1991	17	38	55	8.58%
1992	18	43	61	9.52%
1993	21	74	95	14.82%
1994	10	34	44	6.86%
1983-1994	217	424	641	100.00%

This sample includes SEOs with at least some primary shares conducted by operating companies that have full data availability from CRSP, Compustat, and SDC. Public utilities (SIC codes between 4800-4829 and 4910-4949), firms reporting a financial segment (segment SIC codes between 6000 and 6999), and issuers with total assets less than $5 million are excluded. All multiple segment issuers have at least one segment with an industry (3 digit SIC code) counterpart among the single-segment issuers in the year of the SEO. Likewise, all single-segment issuers have an industry counterpart among the segments of the multiple segment firms in the year of the SEO.

Table 2-2
Descriptive Statistics by Issuer-Type for 641 Equity Issues During the Period 1983-1994

	Multiple Segment (n=217)		Single Segment (n=424)		Differences	
	Mean	Median	Mean	Median	Means	Medians
AR	-2.24%	-2.48%	-2.82%	-3.04%	0.58%	0.56%**
BETA	0.87	0.86	1.05	1.01	-0.18***	-0.15***
RUNUP	49.08%	34.09%	69.35%	47.41%	-20.27%***	-13.32%***
VOLATILITY	2.60%	2.44%	3.09%	2.86%	-0.49%***	-0.42%***
GSPREAD	4.98%	4.97%	5.27%	5.24%	-0.29%***	-0.27%***
PROC	64.61	32.63	44.17	25.07	20.44***	7.56***
SECDUM	0.30	0.00	0.45	0.00	-0.15***	0.00***
CASHTA	0.07	0.04	0.12	0.07	-0.05***	-0.03***
DIVYES	0.70	1.00	0.39	0.00	0.31***	1.00***
RELATIVEQ	0.02	-0.04	0.20	0.14	-0.18***	-0.18***
HERF	0.59	0.57	1.00	1.00	-0.41	-0.43
LEVG	0.32	0.30	0.25	0.23	0.07***	0.07***
MB	1.51	1.27	2.12	1.60	-0.61***	-0.33***
MVE	506.02	137.78	295.27	121.68	210.75***	16.10**

***(**, *) denotes significance at the 0.01 (0.05, 0.10) level.

AR is the abnormal return for the day of the DJNR announcement and the following day calculated from a modified market model estimated over the period 220 to 21 days before the equity issue announcement. BETA is the estimated beta from the market model. RUNUP is the net of market buy and hold return on the firm's stock for the period 205 to 6 days before the equity issue announcement. VOLATILITY is the standard deviation of the market model residuals estimated 221 to 20 days before the equity issue announcement. GSPREAD is the gross spread as a percentage of the offer price. PROC are the gross proceeds of the issue in millions of dollars. SECDUM is a dummy variable that takes the value 1 if the SEO includes any secondary shares. CASHTA is the ratio of cash and short-term investments to total assets. DIVYES is a dummy variable that takes the value of one if the firm paid a dividend in the year before the SEO. RELATIVEQ is the natural logarithm of the ratio of actual market-to-book to imputed market-to-book. HERF is the asset based Herfindahl Index. LEVG is the ratio of long-term debt and debt in current liabilities to total assets. In cases where LEVG exceeds one it is set equal to one. MB is the market to book ratio and MVE is the market value of equity in millions of dollars both calculated at the calendar year end prior to the issue date.

Table 2-3
Cross-Sectional Regressions Explaining Variation of Abnormal Returns for 641 Equity Issuers During the Period 1983-1994

Regression	(1)	(2)	(3)	(4)
INTERCEPT	-0.73	0.09	-0.17	4.28**
	(-1.30)	(0.05)	(-0.09)	(2.07)
HERF	-1.76***	-1.45**	-1.69***	-1.27**
	(-2.94)	(-2.25)	(-2.56)	(-1.96)
CASHTA		0.13	-0.49	0.31
		(0.09)	(-0.30)	(0.19)
LEVG		1.97**	2.31**	3.10***
		(2.02)	(2.32)	(3.14)
DIVYES		-0.16	0.01	-0.38
		(-0.44)	(0.03)	(-1.01)
SECDUM		-0.84**	-0.88**	-0.94**
		(-2.37)	(-2.50)	(-2.71)
ln(PROC)		-0.65**	-0.59**	-0.52*
		(-2.32)	(-2.01)	(-1.84)
ln(MVE)		0.45**	0.40*	0.13
		(2.22)	(1.81)	(0.57)
RUNUP			0.002	0.006**
			(0.87)	(2.12)
ln(MB)			0.59	0.93**
			(1.36)	(2.12)
VOLATILITY				-1.15***
				(-4.88)
Adjusted R^2	0.01	0.02	0.02	0.06

***(**, *) denotes significance at the 0.01 (0.05, 0.10) level.

The dependent variable is AR, the percentage abnormal return for the day of the newswire announcement of an equity issue and the following day calculated using a modified market model estimated over the period 220 to 21 days before the announcement. The cross-sectional regression models are estimated using weighted least squares where the weight for each issue is the inverse of the standard deviation of the market model errors. HERF is the asset based Herfindahl Index. CASHTA is the ratio of cash and short-term investments to total assets. DIVYES is a dummy variable that takes the value of one if the firm paid a dividend in the year before the SEO. LEVG is the ratio of long-term debt and debt in current liabilities to total assets. If this ratio exceeds one, LEVG is set to one. SECDUM is a dummy variable that equals 1 if the SEO includes shares not sold by the firm. RUNUP is the net of market buy and hold return on the firm's stock for the period 205 to 6 days before the announcement. The variable ln(PROC) is the natural log of the gross proceeds of the issue in millions of dollars. The variable ln(MB) is the natural log of the market to book ratio of the issuer and the variable ln(MVE) is the natural log of the market value of equity in millions of dollars. Both variables are calculated at the calendar year end prior to the issue date. VOLATILITY is the standard deviation of the market model residuals estimated 221 to 20 days before the announcement. The regression models also include dummy variables for years 1984-1994. The estimated coefficients for the year dummies are not reported below. T-statistics are in parentheses.

Table 2-4
Cross-Sectional Regressions of GSPREAD on Firm and Issue Characteristics for 641 Equity Issuers During the Period 1983-1994

Regression	(1)	(2)	(3)
INTERCEPT	4.33***	13.41***	12.29***
	(20.44)	(35.17)	(31.91)
HERF	1.08***	0.05	-0.10
	(4.78)	(0.35)	(-0.65)
ln(PROC)		-0.88***	-0.81***
		(-26.78)	(-24.83)
PCTSOLD		1.98***	1.21***
		(9.35)	(5.45)
VOLATILITY			0.24***
			(8.38)
Adjusted R^2	0.04	0.62	0.66

***(**, *) denotes significance at the 0.01 (0.05, 0.10) level.

GSPREAD is the gross spread as a percentage of the offer price. HERF is the asset based Herfindahl Index. The variable ln(PROC) is the natural log of the gross proceeds of the issue in millions of dollars. PCTSOLD is the ratio of total shares offered and shares outstanding before offer. VOLATILITY is the standard deviation of the errors from the market model estimated over the period 220 to 21 days before the equity issue announcement. The regression models also include dummy variables for years 1984-1994. The estimated coefficients for the year dummies are not reported below. T-statistics are in parentheses.

CHAPTER 3
EVIDENCE FROM ANALYSTS' FORECASTS

Introduction

Corporate diversification has attendant benefits and costs. The primary theoretical benefit attributed to corporate diversification stems from the creation of an internal capital market (Williamson (1975) and Stein (1997)). Ironically, recent empirical research calls into question the net benefits of an internal capital market. While the ability to avoid the vagaries of the external capital market should lead to more efficient investment, avoiding the attendant discipline of the external capital market may actually lead to more agency related inefficient investment (Scharfstein and Stein (1997) and Scharfstein (1998)). The empirical finding that, on average, diversified firms sell at discounts to similarly constructed portfolios of pure-play firms is consistent with the costs of diversification outweighing the benefits (Lang and Stulz (1994) and Berger and Ofek (1995)). Further, these discounts appear to be related to the degree of inefficient investment within diversified firms (Shin and Stulz (1997), Billett and Mauer (1998), Rajan, Servaes, and Zingales (1997)).[1] One common prescription is to split conglomerate firms along industry lines into stand-alone, focused firms with separately traded securities. As a result, focus has become a mantra of sorts among some executives and academics.[2]

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[1] For evidence that inefficient investment does not cause the diversification discount, see Whited (1998), Maksimovic and Phillips (1998), and Campa and Kedia (1999).

[2] See Bhide (1990) or "Corporate Breakups Are No Panacea" by Roger Lowenstein in the *Wall Street Journal*, June 5, 1997.

In embracing a return to focus, managers frequently appeal to perceived reductions in information asymmetries in justifying break-ups.[3] A clear implication of this motivation is that diversified firms may be subject to more asymmetric information than focused firms. The basis of this argument, which we term the *transparency hypothesis*, is that separating the divisions into individually operated and/or traded entities mitigates information asymmetries in the market about each division's profitability and operating efficiency. For example, Krishnaswami and Subramaniam (1998) find that firms that engage in spin-offs have larger forecast errors and greater dispersion among forecasts relative to industry and size matched counterparts. This finding suggests that the desire to increase transparency may be an important determinant in firms' choices to refocus. However, many more firms choose to remain diversified rather than to refocus (e.g., see Montgomery (1994), Denis, Denis, and Sarin (1997a), and Liebskind and Opler (1993)).

One possible explanation is that corporate diversification is, on average, associated with a net reduction in asymmetric information. For example, diversification reduces the volatility of cash flows and may make earnings more predictable. Also, the aggregate nature of reported earnings for diversified firms may actually imply less potential for information asymmetry. Assuming that the errors outsiders make in forecasting divisional cash flows are imperfectly correlated across divisions, the absolute value of the percentage error in the forecast of firm cash flows may be smaller for a diversified firm than a focused firm. In other words, while outsiders may make errors in forecasting divisional cash flows, if these errors are not perfectly positively correlated, then the consolidated forecast may be more accurate than a forecast for a firm with only one division. Consequently, the degree to which the expectations of outsiders differ from managers' private information could be reduced. We term this possibility the *information diversification hypothesis*.

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[3] Habib, Johsen, and Naik (1997), Gilson, Healy, Noe, and Palepu (1997), and Hass (1996) cite examples in which managers appealed to information benefits in justifying stock break-ups.

Clearly, these hypotheses are not mutually exclusive. Thus, we empirically examine the relationship between corporate diversification and the degree of asymmetric information faced by outsiders. Our tests use proxies for asymmetric information derived from analysts' forecasts and stock price reactions to earnings announcements. Consistent with both hypotheses outlined above, we find evidence that diversification is associated with both costs and benefits in terms of its affect on our proxies for asymmetric information. However, we find that, on balance, diversification is associated with reductions in proxies for asymmetric information consistent with the information diversification effect dominating the transparency effect in equilibrium. Specifically, we document that diversified firms have significantly smaller forecast errors than similarly constructed portfolios of focused firms and smaller revaluations associated with earnings announcements. These results obtain even after controlling for other factors expected to affect asymmetric information. Our results call into question the widespread notion that corporate diversification strictly exacerbates information problems for most firms.

Although our evidence is consistent with diversification being associated with reductions in proxies for asymmetric information, our tests are clearly only as good as our proxies for asymmetric information. As in Dunn and Nathan (1998), Krishnaswami and Subramaniam (1998), and Gilson, Healy, Noe and Palepu (1998), we examine differences across diversified and focused firms in the accuracy of analysts' forecasts, dispersion among analysts' forecasts, and revaluations associated with earnings announcements. While we conclude that the observed differences indicate less severe asymmetric information problems for diversified firms, it is possible to put forward an alternative explanation of the data. Namely, diversified firms have smaller forecast errors because they are better at managing expectations or earnings or both. Further, this type of management makes reported earnings less informative for valuation purposes and leads to smaller abnormal returns for a given earnings surprise.

We offer several arguments as to why differences across firm type in managing expectations or earnings are not likely to drive our results. First, while firms may provide guidance to analysts in the form of management earnings forecasts or preannouncements, Bhojraj and Thomas (1999) find that managers of diversified firms are less likely to issue earnings forecasts. Additionally, our results hold in a period (the 1980s) before preannouncements for either diversified or focused firms were prevalent.[4]

Second, a priori, it is not apparent that diversified firms have an advantage in terms of tools available to manage earnings to meet expectations. DeGeorge, Patel, and Zeckhauser (1998) point out that, within generally accepted accounting principles, executives have choices over inventory methods, allowances for bad debts, expensing of research and development, recognition of sales not shipped, estimation of pension liabilities, capitalization of leases and marketing expenses, delay in maintenance expenses, and so on.[5] All of these choices are common to both diversified and focused firms. It would seem that diversified firms should have an advantage in terms of managing earnings through acquisition and divestiture activity. But, many divestiture studies report that a significant fraction of divested assets or divisions share the same industry affiliation as the seller (e.g., see John and Ofek (1995)). Similarly, while Comment and Jarrell (1995) find diversified firms are more active in the market for corporate control, within-industry mergers by focused firms are likely to present the same bag of accounting tricks to managers. In sum, while we argue that differences in the management of expectations or earnings are not likely to account for our results, this is one inevitable shortcoming of this and other papers that use analysts' forecasts as proxies for asymmetric information.

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[4] There were 252 quarterly or annual profit warnings issued in 1994 according to First Call. In contrast, there were 2,000 profit warnings issued in 1996. See the article entitled "Rise in Profit Guidance Dilutes Positive Surprises" by Greg Ip in the Wall Street Journal, June 23, 1997.

The rest of this chapter is organized as follows. The following section contains the hypotheses to be tested and a review of the existing literature. The third section consists of the sample and empirical design of the tests. The last two sections include the empirical results and a concluding discussion.

Hypotheses Development and Literature Review

The degree of information asymmetry between managers and outsiders may differ for diversified versus focused firms. The source of the difference in asymmetry may be that diversified firms are less transparent than focused firms. For instance, while managers of diversified firms can observe divisional cash flows, outsiders can observe only noisy estimates of divisional cash flows. Thus, the mapping of divisional cash flows into consolidated earnings may be less than transparent to outsiders and reported earnings will convey less value-relevant information. To the extent that accounting figures for diversified firms are less transparent relative to those of focused firms, it is possible that asymmetric information problems are more severe for diversified firms.

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[5] Extraordinary items are not a particular concern in this context because I/B/E/S forecasts and actuals are reported before extraordinary items.

In addition, diversified firms often operate in many different industries while individual financial analysts often specialize within one particular industry. Following a diversified firm will by definition take an analyst out of his or her area of expertise at least along some dimension. Thus, we might expect individual analysts to have greater difficulty in following diversified firms. Dunn and Nathan (1998) find that as the number of diversified firms a particular analyst follows increases, that analyst's accuracy relative to other analysts' declines. To the extent that complexity of diversified firms might reduce the effectiveness of individual analysts in processing and disseminating information about firms, larger information asymmetries between managers and investors could exist.

We refer to the idea that aggregated cash flows and other diversification related information problems make it more difficult for analysts (outsiders) to evaluate/forecast firm cash flows as the transparency hypothesis. The transparency hypothesis would predict that, relative to focused firms, diversified firms should have, all else equal, larger forecast errors, more dispersion among analysts' forecasts, and larger unconditional revaluations around earnings announcements.

To the extent that they are less transparent than focused firms, diversified firms will face more difficulty in raising capital, less stock market liquidity, and, therefore, a higher cost of capital, all else equal. Managers of diversified firms could reduce the information gap by credibly increasing segment disclosure or by breaking up the firm along industry lines into separately operated firms and/or traded securities.

The benefits of increased disclosure have been examined extensively in previous literature, e.g., Merton (1987) and Diamond and Verrechia (1991). Lang and Lundholm (1996) document that firms with more informative disclosure policies as measured by ratings from the Financial Analysts Foundation have larger analyst followings, less dispersion among individual analysts' forecasts, and less volatility in forecast revisions. Baldwin (1984) and Swaminathan (1991) evaluated analyst forecast accuracy around implementation of the SEC's line of business disclosure requirements, which became effective in 1971. Both papers found that multiple segment firms experienced increases in the accuracy of analysts' forecasts and decreases in the dispersion among analysts' forecasts subsequent to the increased disclosure requirements. These findings are consistent with increased disclosure reducing information asymmetries.[6]

In addition to credibly improving disclosure, managers can break the conglomerate firm into distinct firms and/or traded securities along industry lines to improve transparency. For instance, a frequently cited motivation for focus increasing transactions and tracking stock issues is management's desire to make their companies easier for investors to evaluate. A direct implication of this rationale is that the potential for information asymmetry between managers and outsiders is greater for more diversified firms.

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[6] Nagarajan and Sridhar (1996) describe conditions under which increased segment disclosure requirements could lead to a reduction in value-relevant disclosures and, hence, more asymmetric information.

Habib, Johnsen, and Naik (1997) present a model in which splitting a firm along industry lines into separately traded firms leads to more informative stock prices. More informative prices improve the quality of managers' investment decisions and reduce uninformed investors' uncertainty about asset values. Similarly, Nanda and Narayanan (1997) present a model of optimal corporate scope in which managers trade off the benefits of internal capital markets against diversification related asymmetric information costs.

Gilson, Healy, Noe, and Palepu (1997) document reductions in proxies for asymmetric information among firms that conduct stock break-ups, i.e., spin-offs, carve-outs, or targeted stock offerings. Similarly, Zuta (1997) reports improved correspondence between the sum of segment cash flows and consolidated firm cash flows for diversified firms subsequent to targeted stock issues. Krishnaswami and Subramaniam (1998) find that, relative to control firms, diversified firms that conducted spin-offs had larger forecast errors, greater dispersion among forecasts, and larger revaluations around earnings announcements. Further, Krishnaswami and Subramaniam (1998) also find that firms that engaged in spin-offs subsequently raised more external capital than a control group of firms that didn't engage in spin-offs. This finding is consistent with some firms conducting spin-offs in an effort to reduce asymmetric information prior to approaching the capital markets.

While the stock break-up results provide compelling evidence in support of the transparency hypothesis, it is important to recognize the potential limitations of these papers. First, all of these studies, by definition, consider only firms that changed organizational form. These are precisely the subsets of firms that would be expected to have suffered the greatest diversification related information problems. Second, it is not entirely clear that the source of the reduction in information asymmetry is improved transparency. Denis, Denis, and Sarin (1997b) report that decreases in diversification are frequently associated with external corporate control threats, financial distress, and management turnover. Thus, the improvements in asymmetric information proxies around break-ups may be due to the resolution of uncertainty regarding these events' potential impact on earnings.

By examining changes at the margin, these papers cannot address the fundamental question of how firm diversification and asymmetric information are related for the broad cross-section of firms that do not choose (or are not forced) to refocus or issue tracking stock (or diversify for that matter). These papers suffer from a sample selection bias in this regard. The results of this study are not subject to this sample selection bias and apply to a much broader cross-section of firms.

Unlike previous papers, we also explicitly recognize the potential benefits of diversification in the context of analysts' forecast characteristics and reactions to earnings surprises. The aggregate nature of reported earnings for diversified firms may imply less potential for information asymmetry. For example, diversification is well known to reduce the volatility of cash flows and may make earnings more predictable. Further, assuming that the errors outsiders make in forecasting divisional cash flows are imperfectly correlated across divisions, the absolute value of the percentage error in the forecast of firm cash flows may be smaller for a diversified firm than a focused firm. In other words, while outsiders may make errors in forecasting divisional cash flows, if these errors are not perfectly positively correlated, then the consolidated forecast may be more accurate than a forecast for a firm with only one division. Consequently, the degree to which the expectations of outsiders differ from managers' private information could be reduced. Again, we term this possibility the information diversification hypothesis.

Subrahmanyam (1991) and Gorton and Pennachi (1993) draw on similar reasoning to explain the potential information benefits of trading baskets of stocks rather than the individual stocks that comprise the baskets. They demonstrate that basket securities are subject to less asymmetric information (and, hence, adverse selection) precisely because their cash flows are aggregates. Thus, information asymmetries are often lower for the basket security than for the individual securities which constitute the basket. To the extent that diversified firms represent basket securities comprised of focused firms, these same arguments imply diversified firms may be less subject to asymmetric information problems than focused firms.

This reasoning is consistent with anecdotal evidence from analysts' comments regarding General Electric (GE). GE operates in many different industries. Additionally, a significant fraction of GE's assets are opaque financial assets. These factors should combine to make GE less than transparent. However, Ben Zacks of Zacks Investment Research indicates that analysts' forecasts for GE actually fall in a "very, very tight range." While GE is well known to provide "guidance" to analysts, individual analysts also appeal to the fact that GE is a well-diversified portfolio in explaining the remarkable accuracy of and lack of dispersion among their forecasts for GE.[7]

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[7] See the article entitled "Managing Profits: How General Electric Damps Fluctuations In Its Annual Earnings" by Randall Smith, Steven Lipin, and Amal Naj in the *Wall Street Journal*, November 3, 1994.

The information diversification hypothesis would predict that, relative to focused firms, diversified firms have smaller forecast errors, less dispersion among analysts' forecasts, and smaller unconditional market reactions to earnings announcements.

Haw, Jung, and Ruland (1994) find that, on average, analysts' forecast accuracy decreases for firms immediately subsequent to completing an acquisition but returns to pre-acquisition levels within several years. However, the temporary reduction in accuracy is significantly less pronounced for the subset of acquisitions that provide industry diversification. Haw, Jung, and Ruland (1994) attribute this to the reduction in post-merger earnings volatility that results from combining cash flow streams with low correlations.

While the present study uses analysts' forecast data, Hadlock, Ryngaert, and Thomas (1998) examine the relationship between firm diversification and asymmetric information in the context of seasoned equity offerings (SEO). They find that equity issue announcements by diversified firms are met with significantly less negative revaluations than announcements by focused firms. These results are consistent with firm diversification alleviating asymmetric information problems for firms that choose to issue equity perhaps by allowing diversified firms to better time issues to coincide with periods of particularly low information asymmetry. However, these results are subject to the same self-selection criticism as the stock break-up literature.

Data and Empirical Design

Description of Sample

We draw our initial sample of analyst forecast and actual earnings data from I/B/E/S. As our consensus forecast, we use the median forecast reported for the month closest to, but preceding, the month in which actual earnings were released. We require that each sample firm have a minimum of three analysts providing forecasts. The forecast data are for fiscal years ending between July 1985 and June 1996. For all firms with the necessary I/B/E/S data, we identify those firms that also have data available from Compustat on both a consolidated and industry segment basis (both research and active files). All variables constructed from Compustat data are measured at the end of the fiscal year that precedes the year of the forecast. We exclude firms with reported business segments that are regulated utilities (SIC codes between 4800-4829 and 4910-4949) or financial services operations (SIC codes between 6000-6999). For the remaining firms, we identify those with data available from CRSP. We then exclude foreign firms, ADRs, and real estate investment trusts. From this sample, we then exclude those observations where the absolute forecast error, |actual EPS-median forecast EPS|, exceeds 100% of the stock price five days before earnings are announced (Ali, Klein, and Rosenfeld (1992) and Frankel and Lee (1996)). We also exclude those observations where the standard deviation of analysts' forecasts is greater than 20% of the stock price.[8]

In order to obtain consistency between the stock prices (from CRSP) used as deflators and I/B/E/S EPS data, we restate actual and forecasted EPS using the I/B/E/S stock split adjustment factors to recover pre-split forecasts and actuals. Thus, the EPS data in our sample reflect the numbers as reported at the time the forecasts were made. A total of 12,282 forecast years remain after all screens.

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[8] This screen results in the deletion of only 29 observations. To ensure our results aren't driven by this criteria, we tried several other cutoffs (e.g., standard deviation greater than 10%, 25%, or 30% of stock price). Our results are not sensitive to the criteria used.

Table 3-1 provides details on the characteristics of the sample. The frequency of observations by forecast year and firm-type is reported in Panel A. While the number of observations per year grows over the sample period, much of this growth stems from Compustat and I/B/E/S expanding the coverage of their databases. For example, I/B/E/S first began covering Nasdaq firms in 1984 and has since expanded its coverage of Nasdaq firms. Thus, many firms arriving on the databases over this period had high levels of focus as evidenced by the increase in single segment firm observations.[9]

The frequency of observations by firm, industry, and fiscal year is reported in Panel B. There are 2,677 distinct firms represented, each of which is included an average (median) of 7 (8) times. These firms operated in 224 distinct industries (3 digit SIC codes) with a mean (median) individual industry representation of 192 (88) firm years per industry. There are 11 fiscal years included in the sample, with a mean (median) of 1,189 (1,133) observations per year.

Diversification Measures

We calculate two measures of firm diversification. A coarse measure of diversification is a binary variable called MULTISEG, which takes a value of 1 if a firm reports more than one segment and 0 otherwise. As a finer measure of diversification, we use an asset based Herfindahl Index, which we call HERF. This variable reflects the degree to which the assets of a firm are concentrated within its divisions. For each firm, HERF is calculated as the sum of the squares of each segment's assets as a proportion of the firm's total assets. Thus, for firm i in year t we measure HERF as

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[9] See Comment and Jarrell (1995) for some evidence regarding the focus levels of firms arriving on Compustat during the 1980s.

$$\mathrm{HERF}_{it}=\sum_{j=1}^{N_{it}}\left(TA_{jit}\Big/\sum_{j=1}^{N_{it}}TA_{jit}\right)^{2},$$

where N_{it} is the number of segments of firm i at time t and TA_{jit} are the assets attributable to segment j of firm i at time t. HERF equals 1 for all single segment firms and is less than 1 for multiple segment firms, where smaller levels of HERF correspond to less concentration of assets among segments and greater diversification.[10]

Forecast Accuracy and Dispersion

To assess the relationship between firm diversification and asymmetric information, we use two proxies for asymmetric information based on properties of analysts' forecasts. More particularly, we use the accuracy of consensus forecasts and the dispersion among forecasts. These proxies are based on forecasts made in the month before actual earnings were released. We chose to analyze forecast characteristics for the shortest possible forecasting horizon in order to minimize the optimism bias that appears to exist in forecasts made at the beginning of a fiscal year (O'Brien (1988) and Brous (1992)). Additionally, the errors in forecasts made very near to the end of a forecasting period have been shown to be comprised primarily of firm specific information rather than economy- or industry-wide information (Elton, Gruber, and Gultekin (1984)). These two factors make forecasts very near the end of a forecasting period particularly attractive as proxies for assessing differences in asymmetric information across firms.

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[10] A potential weakness of the within-firm Herfindahl index is that it makes no distinction between related and unrelated diversification. As an alternative to HERF, we used the Caves, Porter, and Spence (1980) concentric index, which captures the degree of unrelated diversification, and obtained very similar results. Additionally, we obtained similar results when we used the either the multiple segment dummy or the number of reported segments as our diversification proxies. Thus, our reported results are quite robust to the choice of diversification metric.

As our primary measure of forecast accuracy, we use ERROR, which is the absolute difference between actual earnings and the median forecast deflated by the stock price five days before the earnings announcement date. Firms with larger differences in information asymmetry between managers and outsiders regarding firm earnings are expected to have larger forecast errors.

DISPERSION is the standard deviation of analysts' forecasts in the month before actual earnings are announced deflated by the stock price five days before the earnings announcement date. This variable represents a measure of disagreement among analysts. Since disagreement could be an indication of the lack of available information about a firm, we use DISPERSION as a proxy for of the level of information asymmetry.

In order to examine the relationship between diversification and information asymmetry, we regress forecast accuracy and dispersion on our diversification measure, HERF. The transparency hypothesis would predict that higher HERF, or greater focus, should be associated with smaller forecast errors and less dispersion among forecasts. Alternatively, the information diversification hypothesis would predict higher HERF should be associated with larger forecast errors and greater dispersion among forecasts.

In order to draw appropriate inferences from the forecast analysis, we also control for other factors that may impact forecast characteristics. Primary among these is firm size. Firm size can be expected to increase forecast accuracy and reduce forecast dispersion (Atiase(1985)). We include the variable MVE, which is the market value of a firm's equity at the end of the previous fiscal year.

Analysts may face more difficulty forecasting earnings for firms with a lot of valuable growth options relative to firms whose values are comprised mainly of assets-in-place. Thus, we also include in our analysis the firm's market-to-book ratio, which is intended to proxy for the quality of a firm's investment opportunities. This variable, MB, is defined as the ratio of the firm's market value (market value of equity plus the book value of total assets minus the book value of equity) to the firm's book value of total assets at the prior fiscal year end. Similarly, Barth, Kasznik, and McNichols (1998) conjecture that the level of analyst effort and, perhaps by extension, the quality of analysts' forecasts vary with the degree to which firm value is comprised of tangible assets. Thus, we also include INTGTA, the ratio of intangible assets to total assets at the previous fiscal year end.

Since leverage adds to the volatility of earnings, we include LEVG, the ratio of long-term debt and debt in current liabilities to total assets.[11] Firms with higher leverage might be expected to have less accurate forecasts and more dispersion among forecasts.

We also incorporate an additional variable, SALESDEV, which is a binary variable that takes the value of one if the sum of segment sales is not within 1% of consolidated firm sales. This variable is intended to capture the difficulty outsiders face in aggregating sub-unit cash flows for diversified firms. More difficulty in mapping segment cash flows into consolidated cash flows may lead to more disagreement among analysts and less accurate forecasts.

As in Alford and Berger (1998), we also include a measure of stock return volatility calculated as the standard deviation of the market model residuals over the period from 210 to 11 days before the earnings announcement date. We call this variable VOLATILITY. The volatility of stock prices proxies for the amount of price-relevant information about a firm that arrives daily to the market. Alford and Berger (1998) argue that, as volatility increases, the amount of price-relevant information that analysts must process also goes up and analysts' ability to forecast earnings declines. Thus, firms with higher volatility are expected to have larger forecast errors and more dispersion among forecasts.

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[11] In the 39 observations where leverage was greater than 1, we set LEVG equal to 1.

Price Impact of Earnings Surprises

To assess the informativeness of earnings announcements for stock prices, we use event study methodology to estimate abnormal returns (AR) for three-day windows centered on the annual earnings announcement dates from I/B/E/S. In estimating the market model, we use the firm's daily returns and the returns on the CRSP value weighted index over days –210 to –11 where day 0 is the earnings announcement date. Since we are primarily interested in the magnitude of the stock price response to an earnings surprise and not the direction, we use absolute abnormal returns, |AR|, in the tests below.

Dierkens (1991) argues that, all else equal, if the market reacts strongly to the earnings announcements of a given firm, then the managers of that firm have released substantial private information and information asymmetry between insiders and outsiders is large for that firm. Similarly, in many models of time-varying asymmetric information, the periods immediately after earnings announcements are often characterized as being periods of particularly low information asymmetry consistent with the announcement eliminating much of the asymmetry that existed prior to the release.

For example, Korajczyk, Lucas, and McDonald (1991) document that the stock price decline at announcement of a seasoned equity offering is increasing in the time since the last earnings release.

We regress |AR| on our measure of diversification, HERF. The transparency hypothesis would predict larger reactions to earnings surprises for diversified firms relative to focused firms or a negative relationship between |AR| and HERF. Alternatively, if diversification helps to mitigate asymmetric information as posited by the information diversification hypothesis, then HERF should be positively related to |AR|.

We include other variables in the analysis that may impact the market's reaction to an earnings announcement. Clearly, the magnitude of the earnings surprise and the ex-ante disagreement among analysts will influence the market's reaction. Thus, our forecast error and dispersion measures are also included in some specifications. Larger differences between the market's expectations of earnings and actual earnings as well as greater disagreement among analysts' forecasts are expected to elicit bigger reactions from the market (Beaver, Clarke, and Wright (1979)).

The other variables that we use in our analysis to explain abnormal returns are standard in the literature. Primary among these is the volatility of a firm's common stock returns. Hence, we include VOLATILITY, measured as the standard deviation of the market model residuals over the period from 210 to 11 days before the earnings announcement date. Since firm size may be related to asymmetric information, we include MVE. We also include the firm's market-to-book ratio, which is intended to proxy for the quality of a firm's investment opportunities. Leverage may influence abnormal returns. Thus, we include LEVG, the ratio of long-term debt plus debt in current liabilities to total assets. INTGTA is the ratio of intangible assets to total assets and SALESDEV is our proxy for the difficulty of mapping segment cash flows into total firm cash flows.

Analyst Coverage

The number of analysts following a firm has been used as a proxy for the net supply of information about a firm (e.g., Brennan and Subrahmanyam (1995), Brennan, Jegadeesh, and Swaminathan (1993), and Hong, Lim, and Stein (1998)). To assess the relationship between firm diversification and analyst following, we regress analyst following on HERF and other control variables. We measure analyst coverage (ANALYSTS) as the number of analysts with earnings forecasts in the month closest to, but preceding, the annual earnings announcement.

The other variables that we use in our analysis are based on prior analyst coverage research. Firm size is a major determinant of analyst following. We include the variable MVE, which is the market value of a firm's equity at the end of the previous fiscal year. We also include in our analysis, MB, the firm's market-to-book ratio, which is intended to proxy for the quality of a firm's investment opportunities.

Following Bhushan (1989), we include our measure of stock return volatility, VOLATILITY.[12] Firms with greater VOLATILITY are expected to have larger analyst followings. We also include a measure of the correlation between a firm's returns and the market's returns as an explanatory variable. Bhushan (1989) argues that the cost of information acquisition is lower for a firm with higher correlation with the market. Correlation with the market is captured by RSQMKT, which is the R^2 from the market model regression over the period 210 to 11 days before the earnings announcement.

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[12] As an alternative measure of return variability, we used the standard deviation of the firm's raw returns over the period 210 to 11 days before the earnings announcements. The results were virtually identical.

Following Barth, Kasznik, and McNichols (1998), we include INTGTA, the ratio of intangible assets to total assets at the previous fiscal year end. We also include SALESDEV, our proxy for the difficulty of mapping segment cash flows into total firm cash flows. More difficulty in mapping segment cash flows into consolidated cash flows may lead to more demand for analyst services.

All else equal, larger analyst followings may result in greater private information acquisition and, consequently, less asymmetric information between managers and outsiders. Alternatively, smaller analyst followings may indicate that a firm is very transparent and there isn't much valuable private information to be discovered. Thus, in equilibrium, the number of analysts following a firm may be either positively or negatively related to the level of asymmetric information surrounding the firm. As a result, it may be difficult to make inferences regarding the relationship between firm diversification and asymmetric information from differences in analyst followings between diversified and focused firms. The specific caveats associated with these tests are discussed further in the section "Analyst Following Regression Results."

Results

Univariate Comparisons

Table 3-2 reports descriptive statistics grouped by whether the firm reported having multiple segments or a single segment. While the dispersion among analysts' forecasts is similar for single and multiple segment firms, the accuracy of the forecasts is quite different across firm type. The mean absolute forecast error is 3.71% for multiple segment firms and 4.59% for single segment firms. Thus, analysts' earnings forecasts for multiple segment firms are significantly more accurate than those for single segment firms. Also, multiple segment firms have larger analyst followings than single segment firms. However, given that multiple segment firms are also bigger than single segment firms, it will be important to control for firm size in our multivariate tests below.

While the signed abnormal returns associated with the earnings announcements are not different across firm type, the magnitude of the returns as measured by $|AR|$ is quite different. The mean absolute abnormal return to an earnings announcement is 3.47% for a multiple segment firm and 4.96% for a single segment firm. Thus, the price impacts of earnings reports are significantly larger for single segment firms than multiple segment firms consistent with larger information asymmetries between managers of focused firms and outsiders.

It is clear from the descriptive statistics that multiple segment firms differ in many ways from single segment firms. Consistent with portfolio theory, multiple segment firms have less volatility in abnormal returns. The returns of multiple segment firms have higher correlation with the returns on the market than do the returns of single segment firms. Also, multiple segment firms are considerably larger than single segment firms. Consistent with Lang and Stulz (1994), multiple segment firms have lower market to book ratios than single segment firms. Additionally, multiple segment firms utilize more leverage than single segment firms and report more intangible assets as a fraction of total assets. In almost 11% of multiple segment firm years, segments sales do not sum to within 1% of consolidated sales.

Forecast Accuracy and Dispersion Regression Results

The regression results using HERF to explain analysts' forecast errors are reported in Table 3-3. In the first column of Table 3-3, the only explanatory variable besides year dummies, is HERF. The coefficient on HERF is positive and highly significant. Thus, it appears that analysts' forecasts for focused firms are less accurate than for diversified firms. This is consistent with the information diversification hypothesis and inconsistent with the transparency hypothesis. Recall these hypotheses are not mutually exclusive. Thus, a cautious interpretation of the positive coefficient on HERF is that the information diversification hypothesis dominates the transparency hypothesis in terms of net effects on analysts' forecast accuracy.

Given the correlation between diversification and other firm characteristics that we documented in Table 3-2, we introduce additional control variables that may influence analysts' forecast accuracy. In column 2 of Table 3-3, we add ln(MVE) and ln(MB). The negative coefficient on firm size is consistent with larger firms having smaller forecast errors. Firms with higher market-to-book ratios have more accurate forecasts as evidenced by the negative and significant coefficient on ln(MB).

In column 3 of Table 3-3, we include LEVG. The coefficient on this variable is positive and significant. Thus, firms with higher leverage have less accurate analyst forecasts. In column 4 of Table 3-3, we include the natural log of one plus the ratio of intangible assets to total assets and SALESDEV. Firms with more intangible assets appear to have more accurate analysts' forecasts as evidenced by the negative and significant coefficient on ln(1+INTGTA). Finally, firms whose segment cash flows do not sum to consolidated cash flows do not appear to have less accurate analysts' forecasts.

In column 5 of Table 3-3, we add our volatility measure. Volatility is an important determinant of forecast accuracy as evidenced by the dramatic increase in adjusted R^2. As expected, firms with greater volatility have larger forecast errors. Interestingly, the coefficient on HERF becomes negative and marginally significant (t=-1.75). Comment and Jarrell (1995) show that firm diversification helps to significantly reduce volatility. Thus, the results in Table 3-3 are consistent with the following interpretation. Firm diversification increases the accuracy of analysts' forecasts through its affect on volatility but also decreases the accuracy of analysts' forecasts due to transparency problems that accompany diversification.[13]

This interpretation is subject to an important caveat. It's not entirely clear that volatility should be included in this specification. A stock that experiences larger price movements in response to new information concerning the stock will have greater return volatility.[14] Hence, we expect that higher levels of volatility may itself proxy for larger differences between a manager's knowledge of actual earnings and the market's outside assessment of earnings. In fact, other authors have used volatility as an explicit proxy for asymmetric information (e.g., Krishnaswami and Subramaniam (1998), Bhagat and Frost (1986), and Dierkens (1991)). To the extent that volatility does capture asymmetric information in addition to uncertainty faced by analysts, we are regressing one measure of asymmetric information against another.

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[13] Dunn and Nathan (1998) report similar results. However, the authors interpret the coefficient on the diversification variable as evidence that diversified firms are subject to larger information asymmetries. This interpretation doesn't consider the documented benefit of diversification in terms of reduced volatility. Dunn and Nathan (1998) conjecture that the benefits of reduced volatility are only likely to be substantial in special cases where the correlation between divisional cash flows is negative. However, portfolio theory would predict these benefits are present anytime divisional cash flows are not perfectly positively correlated.

[14] VOLATILITY is almost certainly an overestimate of information asymmetry since it includes the impact of information that was previously unavailable to both managers and outsiders.

The regression results using HERF to explain dispersion among analysts' forecasts are reported in Table 3-4. In the first column of Table 3-4, the only explanatory variable besides year dummies, is HERF. The coefficient on HERF is positive and highly significant. Since increases in HERF represent increases in focus, it appears that analysts' forecasts are more dispersed for focused firms than for diversified firms.

In columns 2-4 of Table 3-4, we add our control variables with the exception of volatility. The controls affect dispersion among forecasts much as they affect forecast accuracy. The negative coefficient on firm size is consistent with larger firms having less forecast dispersion. Firms with higher market-to-book ratios also have less forecast dispersion. Firms with higher leverage have more dispersion among analysts' forecasts while firms with more intangible assets appear to have less dispersion among analysts' forecasts. Finally, the mapping of segment cash flows into consolidated cash flows does not appear to influence the dispersion among analysts' forecasts. The coefficient on HERF remains positive and significant in each of these specifications.

In column 5 of Table 3-4, we include VOLATILITY. As with the forecast accuracy results above, volatility is an important determinant of forecast dispersion as evidenced by the dramatic increase in adjusted R^2. Firms with greater VOLATILITY have more dispersion among analysts' forecasts. Again, the coefficient on HERF is negative and marginally significant (t=-1.75) after controlling for volatility.

The results in Table 3-3 and 3-4 are consistent with firm diversification helping to alleviate asymmetric information, i.e., outsiders are better able to predict the earnings of diversified firms relative to focused firms due to reduced volatility. However, after controlling for this affect, diversification leads to more dispersion and less accurate forecasts. Taken together, the results from Tables 3-3 and 3-4 are not conclusive regarding which effect dominates. In the section below, we attempt to disentangle these effects using more powerful tests.

The results reported in Tables 3-3 and 3-4 are robust to logical cuts of the sample (e.g., diversified firms, firms that survived at least five years, firms above/below median size, etc.). Also, to mitigate potential problems with errors being cross-sectionally correlated, we ran the regressions separately for each year and averaged the annual coefficients. The magnitudes, signs, and significance levels of all the coefficients were very similar to those reported in the pooled time-series, cross-sectional results of Tables 3-3 and 3-4.

Forecast Errors for Similarly Constructed Portfolios of Focused Firms

The tests in the previous section have several potential shortcomings. First, while the results are consistent with the intuitive conclusion that diversification alleviates information problems via a reduction in volatility while exacerbating information problems due to transparency, it is difficult to determine which effect dominates.[15] In essence, the regressions are comparing diversified firms, which are actually portfolios of focused firms, with individual stand-alone focused firms. Clearly, portfolio theory would predict that diversified firms have significantly less volatility than focused firms. Second, there are no industry controls included. If diversified and focused firms tend to operate in businesses that have different levels of asymmetric information, then our diversification measure could simply be capturing industry differences. In light of the obvious difficulties of assigning a conglomerate to a particular industry (2 or 3 digit SIC code), this problem cannot be adequately addressed via industry dummies.

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[15] The primary difficulty lies in determining the magnitude of the reduction in VOLATILITY that is actually attributable to corporate diversification.

In an effort to address these two weaknesses, we compare diversified firms with portfolios of focused firms that operated in similar industries during the same time period. More specifically, we contrast the forecast errors of diversified firms with those of similarly constructed portfolios of focused firms. This approach allows us to construct a powerful test of the transparency hypothesis while controlling for differences in diversification. The procedure for constructing these size and industry matched portfolios is described here. For each year, we proceed by identifying all the distinct industry segments of our multiple segment firms. We then identify for each segment those focused firms in our sample that operated in the same industry (3 digit SIC code) as the segment during the same forecast year. We choose as a tentative match the focused firm in the same industry as the segment that is closest in size (assets) to the segment. In order to obtain a reasonable trade-off between industry and size matching, we impose the condition that the assets of the matching firm must be within 50% of the assets of the segment. If such a match is not found at the 3 digit level, we choose among the possible matching firms at the 2 digit level. If the size criterion is not met at the 2 digit level, then the segment goes unmatched.

The 3,814 multiple segment firm years in our sample included 10,620 distinct segment years. Matching firms that met the screens above were identified for 5,561 of these segment years. In our sample, 1,457 segment years had suitable matches at the 3 digit level and 4,104 segment years had suitable matches available only at the 2 digit level. The mean (median) ratio of segment assets to matching firm assets is 0.99 (0.99). Thus, the focused firms are very close in size to their segment counterparts. A total of 1,963 multiple segment firm years had each of its industry segments matched with a focused firm of similar size and industry affiliation. These matching firms are used to construct portfolios of focused firms that approximate diversified firms in terms of segment size and industry composition.

We calculate several forecast error metrics for the matching firm portfolios. First, we calculate

$$\text{PFLERR1} = \sum_{i=1}^{N_i} w_i * |MFERROR_i|,$$

where w_i is the ratio of segment i's assets to the sum of segment assets, $MFERROR_i$ is the matching firm forecast error as a percentage of stock price, and the summation is over the N segments of the diversified firm. Thus, PFLERR1 is a weighted average of the absolute forecast errors of matching firms where the weights are the respective sizes of the segments relative to the conglomerate. By taking weighted averages of the *absolute* matching firm forecast errors, we are treating any deviations from actual earnings as asymmetric information. In other words, if some focused firms had negative forecast errors and others had positive forecast errors, then they would not offset each other and reduce the forecast error of the matching firm portfolio.

In contrast, we also calculate

$$\text{PFLERR2}=\left|\sum_{i=1}^{N_i} w_i * MFERROR_i\right|,$$

where w_i is the ratio of segment i's assets to the sum of segment assets, MFERROR_i is the matching firm forecast error as a percentage of stock price, and the summation is over the N segments of the diversified firm. Thus, PFLERR2 is a the absolute value of the weighted average of the *signed* forecast errors of matching firms where the weights are the sizes of the segments relative to the size of the conglomerate. By taking weighted averages of the *signed* matching firm forecast errors, the matching firm forecast errors can offset each other if they are of opposite sign and reduce the overall matching firm portfolio forecast error. Thus, the transparency hypothesis would predict that the forecast error for a similarly constructed portfolio of focused firms would be smaller than that of the diversified firm. In other words, allowing errors to cancel out across focused firms would provide the same benefits of diversification (i.e., reduced volatility) that conglomerate firms may enjoy without introducing any of the transparency problems that conglomerates may suffer from.

Table 3-5a reports the comparisons of diversified firms' forecast errors and PFLERR1. Diversified firms have significantly smaller forecast errors (both mean and median) when we do not allow errors to cancel out among the focused firms that comprise the matching portfolios. The magnitudes are sizable as well with the average difference (across all sample years) representing 1.18% of the stock price.

Table 3-5b reports the comparisons of diversified firms' forecast errors and PFLERR2. Recall that PFLERR2 is the absolute value of the weighted average of matching firm *signed* forecast errors. Thus, overestimates can offset underestimates and vice versa. Intuitively, PFLERR2<PFLERR1. However, diversified firms still have considerably smaller forecast errors than portfolios of size and industry matched focused firms. The average difference remains both economically and statistically significant at 0.8% of the stock price. This is strong evidence against the transparency hypothesis. Additionally, these matching results confirm that for the subsample of diversified firms which are most comparable to the focused firms in our sample, the information benefits of diversification more than offset the costs, on average. The results of Tables 3-5a and 3-5b are robust to several changes in the matching procedure, e.g., relaxing the size screen and/or allowing segment matches at the one digit level.

Price Impact of Earnings Surprises Regression and Matching Results

The regression results using HERF to explain earnings announcement abnormal returns are reported in Table 3-6. Since we're primarily interested in the magnitude of the reaction, we use as our dependent variable |AR|, the absolute abnormal return for the three day window centered on the earnings announcement date. In the first column of Table 3-6, the only explanatory variable besides year dummies, is HERF. The coefficient on HERF is positive and highly significant. Since increases in HERF represent increases in focus, abnormal returns around earnings announcements are significantly larger for focused firms than for diversified firms. This is consistent with the information diversification hypothesis dominating the transparency hypothesis in terms of net effects on abnormal returns around earnings announcements.

Given the correlation between diversification and other firm characteristics documented in Table 3-2, we introduce additional control variables that may influence earnings announcement abnormal returns. In column 2 of Table 3-6, we include the forecast error and dispersion among the forecasts. The coefficient on ERROR is positive and significant consistent with bigger earnings surprises eliciting larger abnormal returns (Beaver, Clarke, and Wright (1979)). The coefficient on DISPERSION is also positive and significant.

In column 3 of Table 3-6, we add ln(MVE), ln(MB), LEVG, ln(1+INTGTA), and SALESDEV. The negative coefficient on firm size is consistent with larger firms having smaller abnormal returns. Firms with higher market-to-book ratios experience larger price reactions. The coefficient on LEVG is negative and significant. Firms with more intangible assets appear to have smaller reactions to earnings announcements. Firms with segment sales that do not map easily into consolidated sales also appear to have larger reactions to earnings announcements but the coefficient is not significant at conventional levels. Most important, the coefficient on HERF remains positive and highly significant.

Since ERROR and DISPERSION are proxies for asymmetric information, in column 4 of Table 3-6, we drop ERROR and DISPERSION from the regression. As expected, the coefficient on HERF as well as its significance are increased in the absence of these two variables.

In column 5 of Table 3-6, we add VOLATILITY. The coefficient on VOLATILITY is positive and highly significant. Thus, firms with more volatile stock returns experience larger abnormal returns around earnings announcements. Not surprisingly, the magnitude and significance of the coefficients on HERF, ERROR, and

DISPERSION in this specification fall though HERF and ERROR remain positive and significant at the 1% level. VOLATILITY also proxies for the degree of asymmetric information facing outsiders. The results in column 5 are consistent with VOLATILITY, HERF, ERROR, and DISPERSION being noisy proxies for asymmetric information. Thus, we interpret the results in column 5 as additional support for the information diversification hypothesis.

The results in Table 3-5 are consistent with smaller unconditional revaluations in response to earnings surprises for diversified firms. However, it may be important to examine the incremental price impact of the earnings surprise conditional on a firm's level of diversification. For example, Nanda and Narayanan (1997) suggest that reported earnings of diversified firms contain less value relevant information due to the aggregate nature of earnings for these firms. To the extent that earnings releases by diversified firms are less informative for valuation purposes, we would expect that, conditional on greater diversification, earnings surprises should elicit smaller stock price reactions. In an effort to determine if there is any differential impact of earnings surprises based on the level of firm diversification, we interacted HERF with both ERROR and DISPERSION. The coefficients (not reported) on the interaction terms were never large in magnitude or statistically significant.

To further investigate the relationship between firm diversification and the markets' reactions to earnings surprises, we also calculate earnings announcement abnormal returns for the matching firm portfolios. Specifically, we calculate

$$|\text{PFLAR}| = \sum_{i=1}^{N_i} w_i * |MFAR_i|,$$

where w_i is the ratio of segment i's assets to the sum of segment assets, $|MFAR_i|$ is the matching firm absolute abnormal return, and the summation is over the N segments of the diversified firm. Thus, |PFAR| is a weighted average of the absolute earnings announcement abnormal returns of matching firms where the weights are the respective sizes of the segments relative to the conglomerate.

Table 3-7 reports the comparisons of diversified firms' abnormal returns and |PFLAR|. As in the regressions, diversified firms have significantly smaller reactions (both mean and median) to earnings surprises. The magnitudes are sizable as well with an average difference in absolute abnormal returns (across all sample years) of almost 1%.

We assessed the robustness of the reported regression results in several ways. First, rather than absolute abnormal returns, we used squared abnormal returns. The primary advantage of this approach was that we could then use the squared VOLATILITY as weights in a weighted least squares regression. Additionally, we used the ratio of announcement to nonannouncement variances as in Korajczyk, Lucas, and McDonald (1991) as our measure of earnings informativeness. We also replicated the regressions for various subsamples of the data (e.g., diversified firms, firms that survived at least five years, firms above/below median size, etc.). Finally, we ran the regressions separately for each year and averaged the annual coefficients. The results using these alternative approaches were very similar to those reported in Table 3-6. The results of Tables 3-7 are also robust to several changes in the matching procedure, e.g., relaxing the size screen and/or allowing segment matches at the one digit level.

Analyst Following Regression Results

The regression results using HERF to explain analyst followings are reported in Table 3-8. In the first column of Table 3-8, the only explanatory variable besides year dummies is HERF. The coefficient on HERF is negative and significant indicating that diversified firms attract more analysts than focused firms; however, diversified firms are generally larger than focused firms. Since, all else equal, larger firms typically have larger analyst followings, the coefficient on HERF in column 1 may be picking up size differences.

In column 2 of Table 3-8, we add firm size and market-to-book. Not surprisingly, the coefficient on firm size is positive and highly significant. The coefficient on market-to-book is negative and significant. Thus, larger firms and firms with lower market-to-book ratios tend to have larger analyst followings. The coefficient on HERF in this specification is positive and highly significant. Thus, after controlling for firm size and quality of investment opportunities, greater diversification is associated with smaller analyst followings.

In column 3 of Table 3-8, we add return volatility and correlation of returns with the market. As in Bhushan (1989), firms with greater return volatility attract more analysts. Also, firms with high correlation between their returns and the returns of the market attract larger analyst followings.

Column 4 of Table 3-8 adds in the ratio of intangible assets to total assets and the sales aggregation variable. As in Barth, Kasznik, and McNichols (1998), firms which have a lot of intangible assets attract fewer analysts. However, firms whose segment cash flows don't sum to within 1% of consolidated cash flows appear to have larger analyst followings.

In sum, the results are consistent with diversified firms having smaller analyst followings. However, given the problems in interpreting analyst following results, it may be difficult to reliably conclude much about the relationship between diversification and asymmetric information from these tests. For example, individual analysts generally specialize by industry. Following a diversified firm will, at least on some dimension, take an analyst out of his or her area of expertise. Thus, some analysts may specialize by following a (few) diversified firm(s) rather than many focused industry participants. This could account for a smaller number of analysts providing forecasts for diversified firms irrespective of how diversification affects asymmetric information.

Conclusion

While improved transparency is an oft cited benefit of focus, we find that, on balance, diversified firms are subject to smaller levels of asymmetric information than are focused firms. This relationship holds over time and after controlling for other factors expected to affect asymmetric information. These results call into question the relevance, at least for most diversified firms, of the information benefits often attributed to focus. In fact, these results suggest that greater corporate diversification is associated with information benefits on average.

These results may help to shed some light on a nagging question associated with the corporate diversification literature. Namely, why do so many firms remain diversified in light of the evidence that diversification appears to be, on average, a value-reducing strategy? Denis, Denis, and Sarin (1997b) appeal to problems associated with the separation of ownership and control. However, information concerns certainly could impact a firm's choice to remain diversified rather than refocus. The findings of this paper could in part explain the reluctance of many diversified firms to pursue a more focused organizational form due to the informational benefits associated with corporate diversification.

Table 3-1
Sample Characteristics

Panel A: Frequency of Observations by Forecast Year and Firm-Type

Forecast Year	Multiple Segment	Single Segment	Total
1985	326	366	692
1986	341	419	760
1987	354	518	872
1988	328	609	937
1989	342	696	1,038
1990	365	766	1,131
1991	342	791	1,133
1992	337	868	1,205
1993	354	1,021	1,375
1994	364	1,172	1,536
1995	361	1,242	1,603
Totals	3,814	8,468	12,282

Panel B: Frequency of Observations as a Function of Firm, Industry, and Year

		Number of Times Represented				
	Total	Minimum	Maximum	Mean	Median	Standard Deviation
Firm	2,677	1	11	7	8	3.40
Industry	224	1	656	192	88	200.43
Year	11	692	1,603	1,189	1,133	284.86

This sample includes firms with analyst forecast and earnings data available from I/B/E/S for fiscal years ending between July 1985 and June 1996. Firms must be followed by at least three analysts and also have data available from Compustat and CRSP. Firms with reported business segments that are regulated utilities (SIC codes between 4800-4829 and 4910-4949) or financial services operations (SIC codes between 6000-6999) are excluded as are foreign firms, ADRs, and REITs. Additionally, observations where the absolute forecast error, |actual-median forecast|, is greater than 100% of the stock price or the standard deviation of analysts' forecasts is greater than 20% of the stock price are also excluded.

Table 3-2
Descriptive Statistics by Firm-Type

	Multiple Segment (n=3,814)		Single Segment (n=8,468)		Differences	
	Mean	Median	Mean	Median	Means	Medians
ERROR	3.71%	1.21%	4.59%	1.24%	-0.88%***	-0.03%***
DISPERSION	1.02%	0.53%	1.03%	0.49%	-0.01%	0.04%
ANALYSTS	12.50	10.00	8.62	6.00	3.88***	4.00***
AR	0.16%	0.08%	0.25%	0.04%	-0.09%	0.04%
|AR|	3.47%	2.43%	4.96%	3.40%	-1.49%***	-0.97%***
VOLATILITY	1.97%	1.74%	2.83%	2.61%	-0.86%***	-0.87***
RSQMKT	0.1483	0.0996	0.0876	0.0524	0.0607***	0.0472***
HERF	0.5252	0.5112	1.0000	1.0000	-0.4748	-0.4888
MVE	2,410.57	680.11	835.31	219.02	1,575.26***	461.09***
MB	1.57	1.35	2.14	1.67	-0.57***	-0.32***
LEVG	0.2487	0.2330	0.1922	0.1540	0.0565***	0.0790***
INTGTA	0.0627	0.0158	0.0438	0.0000	0.0189***	0.0158***
SALESDEV	0.1067	0.0000	0.0000	0.0000	0.1067	0.0000

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

All I/B/E/S forecast data are for the month closest to, but preceding, the annual earnings announcement. ERROR is the absolute forecast error , |actual-median forecast|, scaled by the firm's stock price five days before the earnings announcement. DISPERSION is the standard deviation of analysts' forecasts scaled by the firm's stock price five days before the earnings announcement. ANALYSTS is the number of analysts with earnings forecasts. AR is the abnormal return for a three day window centered on the earnings announcement date calculated from a market model estimated over the period from 210 to 11 days before the earnings announcement date. |AR| is the absolute value of AR. VOLATILITY is the standard deviation of market model residuals over the period from 210 to 11 days before the earnings announcement date. RSQMKT is the R^2 from the market model regression over the period 210 to 11 days before the earnings announcement. HERF is the asset based Herfindahl Index. MVE is the market value of a firm's equity at the end of the previous fiscal year. MB is the ratio of the firm's market value (market value of equity plus the book value of total assets minus the book value of equity) to the firm's book value of total assets at the prior fiscal year end. LEVG is the ratio of long-term debt and debt in current liabilities to total assets. INTGTA is the ratio of intangible assets to total assets at the previous fiscal year end. SALESDEV is a binary variable that takes the value of one if the sum of segment sales is not within 1% of consolidated firm sales for the previous fiscal year. Differences in medians were assessed using a Wilcoxon ranksum test.

Table 3-3
Panel Regressions of the Analysts' Forecast Errors on Firm Characteristics

Regression	(1)	(2)	(3)	(4)	(5)
INTERCEPT	3.12***	19.80***	19.12***	19.11***	-8.75***
	(7.52)	(21.22)	(21.04)	(20.99)	(-7.83)
HERF	2.55***	1.32***	1.42***	1.33***	-0.64*
	(8.65)	(4.03)	(4.38)	(3.88)	(-1.93)
ln(MVE)		-1.15***	-1.18***	-1.17***	0.59***
		(-20.32)	(-20.51)	(-20.46)	(8.68)
ln(MB)		-3.18***	-2.64***	-2.60***	-4.03***
		(-18.66)	(-13.91)	(-13.67)	(-21.40)
LEVG			4.08***	4.47***	4.24***
			(6.95)	(7.42)	(7.85)
ln(1+INTGTA)				-3.80***	-1.47*
				(-4.24)	(-1.87)
SALESDEV				0.10	-0.55*
				(0.34)	(-1.88)
VOLATILITY					3.93***
					(22.94)
Adjusted R^2	0.01	0.09	0.10	0.10	0.26

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

The dependent variable is ERROR, the absolute forecast error , |actual-median forecast|, scaled by the firm's stock price five days before the earnings announcement. HERF is the asset based Herfindahl Index. Ln(MVE) is natural log of the market value of a firm's equity at the end of the previous fiscal year. Ln(MB) is the natural log of the ratio of the firm's market value (market value of equity plus the book value of total assets minus the book value of equity) to the firm's book value of total assets at the prior fiscal year end. LEVG is the ratio of long-term debt and debt in current liabilities to total assets. Ln(1+INTGTA) is the natural log of one plus the ratio of intangible assets to total assets at the previous fiscal year end. SALESDEV is a binary variable that takes the value of one if the sum of segment sales is not within 1% of consolidated firm sales for the previous fiscal year. VOLATILITY is the standard deviation of market model residuals over the period from 210 to 11 days before the earnings announcement date. The regressions also include dummy variables for years 1986-1995. The estimated coefficients for the year dummies are not reported below. T-statistics based on the White-adjusted standard errors are in parentheses. N=12,282.

Table 3-4
Panel Regressions of the Dispersion among Analysts' Forecasts on Firm Characteristics

Regression	(1)	(2)	(3)	(4)	(5)
INTERCEPT	0.87*** (11.07)	3.45*** (20.20)	3.30*** (19.52)	3.29*** (19.52)	-1.24*** (-6.12)
HERF	0.29*** (5.49)	0.23*** (3.83)	0.25*** (4.26)	0.22*** (3.53)	-0.10* (-1.75)
ln(MVE)		-0.18*** (-17.28)	-0.18*** (-17.84)	-0.18*** (-17.72)	0.11*** (8.94)
ln(MB)		-0.82*** (-22.43)	-0.69*** (-17.70)	-0.67*** (-17.29)	-0.91*** (-23.78)
LEVG			0.93*** (7.46)	1.11*** (8.69)	1.07*** (8.96)
ln(1+INTGTA)				-1.78*** (-11.58)	-1.41*** (-9.94)
SALESDEV				0.12 (1.49)	0.01 (0.14)
VOLATILITY					0.64*** (24.73)
Adjusted R^2	0.01	0.10	0.11	0.12	0.24

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

The dependent variable is DISPERSION, the standard deviation of analysts' forecasts scaled by the firm's stock price five days before the earnings announcement. HERF is the asset based Herfindahl Index. Ln(MVE) is natural log of the market value of a firm's equity at the end of the previous fiscal year. Ln(MB) is the natural log of the ratio of the firm's market value (market value of equity plus the book value of total assets minus the book value of equity) to the firm's book value of total assets at the prior fiscal year end. LEVG is the ratio of long-term debt and debt in current liabilities to total assets. Ln(1+INTGTA) is the natural log of one plus the ratio of intangible assets to total assets at the previous fiscal year end. SALESDEV is a binary variable that takes the value of one if the sum of segment sales is not within 1% of consolidated firm sales for the previous fiscal year. VOLATILITY is the standard deviation of market model residuals over the period from 210 to 11 days before the earnings announcement date. The regressions also include dummy variables for years 1986-1995. The estimated coefficients for the year dummies are not reported below. T-statistics based on the White-adjusted standard errors are in parentheses. N=12,282.

Table 3-5a

Conglomerate Forecast Errors vs. Forecast Errors of Similarly Constructed Portfolios of Focused Firms

		ERROR		PFLERR1		Differences	
Year	Obs.	Mean	Median	Mean	Median	Means	Medians
1985	100	5.52%	2.62%	8.83%	4.11%	-3.31%***	-1.49%***
1986	89	6.00%	1.76%	6.07%	2.24%	-0.07%	-0.48%
1987	113	4.84%	1.19%	5.58%	3.26%	-0.74%***	-2.07%***
1988	118	3.84%	1.27%	5.60%	3.17%	-1.76%***	-1.90%***
1989	157	4.54%	1.52%	6.57%	3.08%	-2.03%***	-1.56%***
1990	233	4.87%	1.55%	6.46%	3.03%	-1.59%***	-1.48%***
1991	203	3.74%	1.28%	4.15%	1.88%	-0.41%***	-0.60%***
1992	206	2.99%	0.73%	3.45%	2.00%	-0.46%***	-1.27%***
1993	224	2.48%	0.95%	3.61%	1.61%	-1.16%***	-1.53%***
1994	266	2.03%	0.84%	3.29%	1.50%	-1.26%***	-0.66%***
1995	254	2.72%	0.92%	3.67%	1.85%	-0.95%***	-0.93%***
Overall	1,963	3.62%	1.15%	4.80%	2.25%	-1.18%***	-1.10%***

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

1,963 multiple segment firm years with size and industry matched focused firms for each segment year are included in the analysis below. ERROR is the absolute forecast error, |actual earnings- median forecast|, scaled by the firm's stock price five days before the earnings announcement. PFLERR1= $\sum w_i * |MFERROR_i|$ where w_i is the ratio of segment i's assets to the sum of segment assets, $MFERROR_i$ is the value of the matching firm forecast error as a percentage of stock price, and the summations are over the N segments of each diversified firm. Thus, PFLERR1 is a weighted average of the *absolute* forecast errors of matching firms where the weights are the respective sizes of the segments relative to the conglomerate. Differences in means are assessed using a Wilcoxon signrank test and the differences in medians are assessed using a sign test.

Table 3-5b
Conglomerate Forecast Errors vs. Forecast Errors of Similarly Constructed Portfolios of Focused Firms

		ERROR		PFLERR2		Differences	
Year	Obs.	Mean	Median	Mean	Median	Means	Medians
1985	100	5.52%	2.62%	8.66%	4.05%	-3.14%***	-1.43%**
1986	89	6.00%	1.76%	5.72%	1.72%	0.28%	0.04%
1987	113	4.84%	1.19%	4.80%	2.55%	0.04%	-1.36%**
1988	118	3.84%	1.27%	4.90%	2.15%	-1.06%***	-0.88%
1989	157	4.54%	1.52%	6.02%	2.95%	-1.48%***	-1.43%***
1990	233	4.87%	1.55%	6.17%	2.66%	-1.30%***	-1.11%***
1991	203	3.74%	1.28%	3.96%	1.52%	-0.22%*	-0.24%*
1992	206	2.99%	0.73%	3.13%	1.66%	-0.14%***	-0.93%***
1993	224	2.48%	0.95%	3.35%	1.13%	-0.87%*	-0.18%
1994	266	2.03%	0.84%	2.91%	1.06%	-0.88%**	-0.22%**
1995	254	2.72%	0.92%	3.19%	1.28%	-0.47%	-0.36%
Overall	1,963	3.62%	1.15%	4.41%	1.81%	-0.79%***	-0.66%***

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

1,963 multiple segment firm years with size and industry matched focused firms for each segment year are included in the analysis below. ERROR is the absolute forecast error, |actual earnings- median forecast|, scaled by the firm's stock price five days before the earnings announcement. PFLERR2= $|\Sigma w_i * MFERROR_i|$ where w_i is the ratio of segment i's assets to the sum of segment assets, $MFERROR_i$ is the value of the matching firm forecast error as a percentage of stock price, and the summations are over the N segments of each diversified firm. Thus, PFLERR2 is the absolute value of a weighted average of the *signed* forecast errors of matching firms where the weights are the respective sizes of the segments relative to the conglomerate. Differences in means are assessed using a Wilcoxon signrank test and the differences in medians are assessed using a sign test.

Table 3-6

Panel Regressions of Earnings Announcement Abnormal Returns on Firm Characteristics

Regression	(1)	(2)	(3)	(4)	(5)
INTERCEPT	1.80*** (10.19)	1.56*** (8.74)	8.10*** (17.11)	9.72*** (20.17)	2.44*** (4.33)
HERF	2.61*** (17.64)	2.42*** (16.57)	0.96*** (5.70)	1.07*** (6.27)	0.57*** (3.33)
ERROR		0.06*** (7.66)	0.06*** (7.04)		0.03*** (2.86)
DISPERSION		0.14*** (3.52)	0.16*** (3.89)		0.04 (1.03)
ln(MVE)			-0.46*** (-15.39)	-0.55*** (-18.03)	-0.10*** (-2.74)
ln(MB)			1.07*** (9.23)	0.81*** (7.05)	0.56*** (4.73)
LEVG			-0.58** (-2.08)	-0.15 (-0.53)	-0.35 (-1.29)
ln(1+INTGTA)			-1.06** (-1.95)	-1.56*** (-2.87)	-0.84 (-1.54)
SALESDEV			0.19 (1.09)	0.20 (1.17)	0.08 (0.46)
VOLATILITY					0.94*** (13.61)
Adjusted R^2	0.03	0.05	0.07	0.06	0.10

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

N=12,282.

The dependent variable is |AR|, the absolute abnormal return for the three day window centered on the earnings announcement date calculated using a market model over the period 210 to11 days before the announcement. HERF is the asset based Herfindahl Index. ERROR is the absolute forecast error, |actual earnings- median forecast|, scaled by the firm's stock price five days before the earnings announcement. DISPERSION is the standard deviation of analysts' forecasts scaled by the firm's stock price five days before the earnings announcement. Ln(MVE) is natural log of the market value of a firm's equity at the end of the previous fiscal year. Ln(MB) is the natural log of the ratio of the firm's market value (market value of equity plus the book value of total assets minus the book value of equity) to the firm's book value of total assets at the prior fiscal year end. LEVG is the ratio of long-term debt and debt in current liabilities to total assets. Ln(1+INTGTA) is the natural log of one plus the ratio of intangible assets to total assets at the previous fiscal year end. SALESDEV is a binary variable that takes the value of one if the sum of segment sales is not within 1% of consolidated firm sales for the previous fiscal year. VOLATILITY is the standard deviation of market model residuals over the period from 210 to 11 days before the earnings announcement date. The regressions also include dummy variables for years 1986-1995. The estimated coefficients for the year dummies are not reported below. T-statistics based on the White-adjusted standard errors are in parentheses.

Table 3-7
Conglomerate Earnings Announcement Abnormal Returns vs. Abnormal Returns of Similarly Constructed Portfolios of Focused Firms

		|AR|		|PFLAR|		Differences	
Year	Obs.	Mean	Median	Mean	Median	Means	Medians
1985	100	3.95%	2.75%	4.45%	3.66%	-0.50%**	-0.91%**
1986	89	3.29%	2.66%	4.37%	3.61%	-1.08%**	-0.95%**
1987	113	3.83%	2.91%	4.13%	3.71%	-0.30%	-0.80%
1988	118	2.60%	1.81%	3.89%	3.11%	-1.29%***	-1.30%***
1989	157	2.91%	2.11%	3.43%	2.53%	-0.52%**	-0.42%**
1990	233	4.02%	3.02%	5.05%	4.10%	-1.03%***	-1.08%***
1991	203	3.97%	2.38%	4.57%	3.83%	-0.60%***	-1.45%***
1992	206	3.94%	2.95%	4.23%	3.46%	-0.29%	-0.51%**
1993	224	3.80%	2.55%	4.31%	3.42%	-0.51%***	-0.87%***
1994	266	3.13%	2.13%	4.70%	3.80%	-1.57%***	-1.67%***
1995	254	3.44%	2.51%	5.26%	4.24%	-1.82%***	-1.73%***
Overall	1,963	3.56%	2.46%	4.50%	3.64%	-0.94%***	-1.18%***

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

1,963 multiple segment firm years with size and industry matched focused firms for each segment year are included in the analysis below. |AR| is the absolute abnormal return for the three day window centered on the earnings announcement date calculated using a market model over the period 210 to11 days before the announcement. $|PFLAR| = \Sigma w_i * |MFAR_i|$ where w_i is the ratio of segment i's assets to the sum of segment assets, $|MFAR_i|$ is the value of the matching firm |AR|, and the summations are over the N segments of each diversified firm. Thus, |PFLAR| is the absolute value of a weighted average of the absolute abnormal returns of matching firms where the weights are the respective sizes of the segments relative to the conglomerate. Differences in means are assessed using a Wilcoxon signrank test and the differences in medians are assessed using a sign test.

Table 3-8
Panel Regressions of Analyst Following on Firm Characteristics

Regression	(1)	(2)	(3)	(4)
INTERCEPT	16.11*** (42.56)	-45.37*** (-76.78)	-48.60*** (-64.17)	-48.52*** (-64.82)
HERF	-7.60*** (-23.61)	2.32*** (10.89)	1.94*** (9.31)	2.00*** (9.46)
ln(MVE)		4.31*** (107.72)	4.43*** (80.06)	4.42*** (80.71)
ln(MB)		-1.67*** (-18.71)	-2.27*** (-23.68)	-2.20*** (-23.24)
VOLATILITY			0.93*** (23.08)	0.90*** (22.51)
RSQMKT			7.59*** (12.26)	7.57*** (12.28)
LEVG			-1.71*** (-6.74)	-1.21*** (-4.74)
ln(1+INTGTA)				-4.74*** (-10.30)
SALESDEV				1.05*** (3.82)
Adjusted R^2	0.07	0.64	0.67	0.67

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

The dependent variable is ANALYSTS, the number of analysts providing forecasts in the month before actual earnings are announced. HERF is the asset based Herfindahl Index. Ln(MVE) is natural log of the market value of a firm's equity at the end of the previous fiscal year. Ln(MB) is the natural log of the ratio of the firm's market value (market value of equity plus the book value of total assets minus the book value of equity) to the firm's book value of total assets at the prior fiscal year end. VOLATILITY is the standard deviation of market model residuals over the period from 210 to 11 days before the earnings announcement date. RSQMKT is the R^2 from the market model regression over the period 210 to 11 days before the earnings announcement. LEVG is the ratio of long-term debt and debt in current liabilities to total assets. Ln(1+INTGTA) is the natural log of one plus the ratio of intangible assets to total assets at the previous fiscal year end. SALESDEV is a binary variable that takes the value of one if the sum of segment sales is not within 1% of consolidated firm sales for the previous fiscal year. The regressions also include dummy variables for years 1986-1995. The estimated coefficients for the year dummies are not reported below. T-statistics based on the White-adjusted standard errors are in parentheses. N=12,282.

CHAPTER 4
EVIDENCE FROM TRADING CHARACTERISTICS

Introduction

While financial theory suggests that reducing firm diversification may have both costs and benefits, some executives and members of the financial press appear to have embraced focus as a panacea.[1] A common motivation cited in favor of conglomerate break-ups is that stand-alone firms are subject to less information asymmetry and, thus, may have easier access to external capital markets. For example, it was conjectured that ITT's proposed breakup in 1995 would be beneficial because, in part, "separating out all those businesses should help each to gain access to the cheapest capital."[2] Similar arguments have been advanced in the theoretical finance literature (e.g., see Habib, Johnson, and Naik (1997) and Nanda and Narayanan (1997)).

Nevertheless, the vast majority of diversified firms choose to remain diversified rather than split along industry lines into separately traded firms.[3] Denis, Denis, and Sarin (1998) and Berger and Ofek (1999) find evidence that problems associated with the separation of ownership and control may contribute to the seeming reluctance of firms to split up. Another explanation is that these firms might be preserving valuable internal

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[1] For example, Sadtler, Koch, and Campbell (1997) prescribe that at least half of all diversified firms should be broken up into separately operated and traded firms.

[2] See the article "The Death of the Geneen Machine" in The Economist, June 17, 1995.

[3] Montgomery (1994) reports that the average level of diversification among the largest 500 U.S. public firms increased between 1985 and 1992.

capital markets. This paper investigates a third possible explanation, namely, that diversification may actually reduce asymmetric information problems between firms and the external capital markets. This is because information asymmetries that arise due to firm-specific information may be diversified away when firms are held as segments of a conglomerate. This argument has been formalized in Subramanyam (1991), Gorton and Pennacchi (1993), and Hadlock, Ryngaert, and Thomas (1998).

There is no clear theoretical consensus about the overall effect of firm diversification on the magnitude of asymmetric information problems. Therefore, we compare stock market based measures of asymmetric information for diversified firms with those they could reasonably expect to exhibit if these firms were split along industry lines into separately traded securities. We find that approximately 75% of the diversified firms in our sample have lower levels of asymmetric information as conglomerates than they would have as separately traded pure-play firms. However, we also document evidence that reduced transparency exacerbates information problems for some firms. Moreover, we find evidence that the value of diversified firms relative to similarly constructed portfolios of focused industry counterparts is highest when the relative information benefits associated with diversification appear the largest.

This paper proceeds as follows. In the following section, Hypothesis Development, we further develop the hypotheses to be tested and review the existing literature. The third section, Sample and Variable Construction, contains a description of the sample and empirical design of the tests. The last sections offer empirical results followed by a concluding discussion and the implications of our findings. Appendix B provides additional details on our variable construction.

Hypothesis Development

Williamson (1975) identifies the defining feature of the conglomerate form of organization as the placement of an intermediary, headquarters, between the external capital market and what would otherwise be independent firms. Thus, when a conglomerate is formed, two new relationships are created: the relationship between headquarters and the original firms ("segments" hereafter) and the relationship between headquarters and the external capital market. To fully understand the costs and benefits of diversification, we must understand the implications of both relationships (as well as the interactions between the two).

Much attention has been paid to the implications of the first relationship in terms of its affect on the workings of the *internal* capital markets created. Earlier theoretical literature focuses primarily on the benefits of internal capital markets, e.g., Alchian (1969), Williamson (1975), Gertner, Scharfstein, and Stein (1994), and Stein (1997). Headquarters, in close communication with its segments, may be in a better position to judge the relative merits of projects than arms-length capital providers. Additionally, headquarters' position of control heightens its ability to remove capital from poorly performing segments. More recent theoretical work focuses on the possible negative effects of diversification, e.g., Scharfstein and Stein (1997), Scharfstein (1998), and Rajan, Servaes, and Zingales (1998). Internal politics and the absence of external discipline may induce headquarters to misallocate resources between divisions. The available empirical evidence supports the conclusion that, on average, diversified firms invest inefficiently and, hence, trade at discounts to similarly constructed portfolios of pure-play firms, e.g., Berger and Ofek (1995), Lamont (1997), Scharfstein and Stein (1997), Scharfstein (1998), Shin and Stulz (1998), and Billett and Mauer (1998).[4]

This paper focuses on the second relationship created by forming a conglomerate, i.e., the relationship between headquarters and the *external* capital market.[5] The theoretical literature on corporate diversification offers conflicting predictions about how diversification affects the level of information asymmetry surrounding a firm. On the positive side, if the errors the market makes in valuing a conglomerate's segments are imperfectly correlated, then portfolio theory would suggest that the market's estimate of conglomerate value will be more precise than the separate estimates of the individual segments' values. This idea is the basis of a model in Hadlock, Ryngaert, and Thomas (1999) that illustrates how diversification may, in some cases, reduce the Myers and Majluf (1984) adverse selection costs of issuing equity.[6] Similarly, Stein (1997) points out that diversification taken to its extreme might allow outside investors "to have perfect certainty about the aggregate distribution of investment output, even if they know nothing about the state of individual projects."

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[4] For evidence that inefficient investment does not cause the diversification discount, see Whited (1998), Maksimovic and Phillips (1998), and Campa and Kedia (1999).

[5] In theory, the importance of this relationship may be diminished for diversified firms since they can substitute internally-generated funds for external capital. However, Comment and Jarrell (1995) find that diversified firms are no less reliant on external capital markets (both debt and equity) than are focused firms. Therefore, the question of how diversification affects a firm's access to external capital is an important one in practice.

[6] An additional potential benefit of the reduced potential for misvaluation of diversified firms not modeled by Hadlock, Ryngaert, and Thomas (1999) is a reduction in the costs of outsider monitoring. Of course, as Diamond's (1984) model demonstrates, this argument applies to banks as well as conglomerate headquarters as intermediaries. Gertner, Scharfstein, and Stein (1994), however, argue that headquarters' position of control strengthens its incentives to monitor relative to banks. Restrictions on bank equity holding in the US may also weaken banks' incentives to monitor. Williamson (1975) points out that headquarters' insider position and authority may improve its ability to extract information from segments.

Gorton and Pennacchi (1993) and Subrahmanyam (1991) draw on similar logic in developing an explanation for the growth of the market for index-linked securities, e.g., S&P 500 index futures. These authors suggest that combining individual securities into baskets may reduce the adverse selection costs of trading. The value of private information about the individual securities that constitute the basket is in effect diversified away, allowing market makers to set lower spreads and thereby reduce trading costs for uninformed traders. To the extent that diversified firms represent basket securities, these theories would predict a reduction in trading costs attendant with diversification. Amihud and Mendelson (1988) demonstrate that a reduction in the trading costs associated with a firm's stock will lead to a reduction in the firm's cost of capital and a commensurate increase in firm value.

Several empirical papers have documented evidence consistent with the information advantages of diversification. Jegadeesh and Subrahmanyam (1993) find support for the conjecture that uninformed investors, if given a choice, prefer to trade basket securities rather than individual stocks. Using a sample of S&P 500 stocks, they document an increase in average bid-ask spreads for these stocks following the introduction of the S&P 500 index futures contract. Thomas (1999) finds that, on average, diversified firms have smaller levels of information asymmetry relative to stand-alone firms based on proxies derived from analysts' forecast data and revaluations around earnings announcements. Finally, Hadlock, Ryngaert, and Thomas (1999) examine a direct link between diversification and access to external capital: they find that equity issue announcements by diversified firms are met with significantly less negative abnormal returns than those for focused firms.

We term the possibility that diversification reduces asymmetric information problems the information diversification hypothesis. In summary, the information diversification hypothesis would predict that diversified firms would have lower levels of information asymmetry than focused firms.

There are also compelling reasons to suspect that diversified firms would suffer from larger information asymmetry problems than focused firms. For example, accounting figures for focused firms may be more informative than the accounting figures for diversified firms due to the aggregate nature of diversified firms' accounting reports.[7] Habib, Johnsen, and Naik (1997), for example, present a model in which splitting a firm along industry lines into separately traded firms leads to more informative stock prices. Similarly, Nanda and Narayanan (1997) present a model of optimal corporate scope in which managers trade the benefits of internal capital markets against diversification-related asymmetric information costs. Capozza and Seguin (1997) find that project level cash flows are higher for diversified REITs relative to focused REITs. However, diversified REITs trade at discounts to focused REITs. The authors attribute some of the discount to diversification induced illiquidity.[8]

The empirical work on corporate spin-offs, carve-outs, and targeted stock offerings seems to generally find support for the hypothesis that diversification reduces firm transparency. For example, Gilson, Healy, Noe, and Palepu (1997) and Krishnaswami and Subramaniam (1999) find that the quality of analysts' forecasts improves following stock break-ups. Additionally, Bates, Coughenour, and Shastri (1998) find that measures of stock market liquidity improve for parent firms following spin-offs. It may be misleading, however, to assume that these results generalize to the set of all diversified firms. The firms studied in this literature are the ones that specifically *chose* to undertake these transactions. It may well be that these are precisely the subset of firms for which the information costs of diversification outweigh the benefits. Further, Denis, Denis, and Sarin (1997) and Berger and Ofek (1999) report that decreases in diversification are frequently associated with external control threats, financial distress, and management turnover. The reduction in asymmetric information proxies around break-ups may also reflect the resolution of uncertainty regarding these events.

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[7] Swaminathan (1991) investigates changes in the trading characteristics of diversified firms around the 1970 implementation of the SEC's line of business disclosure requirements.

[8] Danielsen and Harrison (1998) also examine the determinants of REIT market liquidity.

We term the possibility that diversification increases asymmetric information problems the transparency hypothesis. In summary, the transparency hypothesis would predict that diversified firms would have higher levels of information asymmetry than focused firms.

Sample and Variable Construction

We follow a two stage empirical design. First, we investigate the relationship between corporate diversification and asymmetric information proxies derived from stock market trading characteristics. Then we examine whether differences in these proxies can help explain cross-sectional differences in the diversification discount. The sample we assemble thus includes measures of firms' stock market characteristics, diversification, and relative value, as well as variables controlling for other firm-specific characteristics.

Sample Selection

Our initial sample is drawn from the universe of NYSE/Amex firms covered in the Compustat, CRSP, and New York Stock Exchange TAQ databases.[9] Of these, we restrict our attention to those firms with data available from Compustat on both a consolidated and industry segment basis (both research and active files). We also exclude foreign firms, ADRs, REITs, and those firms with segments that are regulated utilities (SIC codes 4800-4829 and 4910-4949) or financial service operations (SIC codes 6000-6999).

Several of our information asymmetry measures are calculated using the transactions level TAQ database. We derive each of the TAQ-based measures separately for each firm for January, February, and March of 1993, 1994, and 1995, respectively. We then average the 3 monthly measures in a particular year to arrive at a single measure of the TAQ-derived variables for each firm-year. In constructing our TAQ-based measures, we apply several screens to assure the cleanliness and comparability of the data. First, we exclude firm-months in which a firm undertook either a stock split or stock dividend and those firm-months with less than 30 transactions. Second, we restrict our attention to companies whose average monthly stock prices were greater than $3 a share. The nature of these screens is similar to those in other studies examining cross-sectional differences in firms' market microstructure characteristics (e.g., Affleck-Graves, Hedge, and Miller (1994) and Flannery, Kwan, and Nimalendran (1999)).

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[9] We restrict our attention to NYSE/Amex firms for two reasons. First, most unlisted firms report only one line of business each year (Comment and Jarrell (1995)). Second, various authors have documented significant differences in spreads and components of spreads across trading mechanisms (e.g., see Affleck-Graves, Hedge, and Miller (1994)).

For firms meeting these screens, the TAQ-variables are then matched with fiscal year-end data from Compustat for the years 1992, 1993, and 1994, respectively. Thus, for firms with December fiscal year-ends, information asymmetry measures are matched with firm characteristics reported for the previous year. Of course, for firms with non-December fiscal year-ends, this relationship does not hold. We have repeated our empirical tests on the subsample of firms with December fiscal year-ends. Since the results are very similar, we report only the full sample results.

Table 4-1 provides details on the characteristics of the sample. The frequency of observations by year and firm-type is reported in Panel A. The frequency of observations by firm, industry, and year is reported in Panel B. There are 1,453 distinct firms represented, each of which is included an average (median) of 2.73 (3) times. These firms operated in 213 different industries (3 digit SIC codes) with a mean (median) industry representation of 38.59 (27) firm-years per industry.

Measures of Information Asymmetry

We use five different measures of information asymmetry. The first of these is the monthly average quoted bid-ask spread (SPREAD), measured as a percentage of stock price, where stock price is defined as the midpoint of the spread.[10] A common result in the theoretical microstructure literature (e.g., Glosten and Milgrom (1985)) is that the bid-ask spread is expected to be increasing in the degree of asymmetric information about a firm. A rational market maker will set the bid-ask spread wide enough to recoup expected losses to informed traders. However, the quoted spread itself may be a somewhat coarse measure of the relative degree of information problems. Price discreteness caused by minimum tick sizes limits market makers' abilities to adjust quotes and sets a lower bound on the spread.

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[10] Following Flannery, Kwan, and Nimalendran (1999), we drop those firm-months for which the measured average quoted spread was greater than 30% of the stock price.

Our second measure is derived from the market microstructure literature that conjectures bid-ask spreads are composed of order processing, inventory, and adverse selection components (e.g., Stoll (1989)). The adverse selection component is defined as that portion of the spread that compensates the market maker for transacting with better-informed traders. The adverse selection component is increasing in the potential supply of private information about a particular firm, i.e., the degree of information asymmetry.

A number of techniques have been developed in the literature to estimate the adverse selection component as a measure of information problems. Our adverse selection cost variable (ASCOST) is derived using the methodology of Lin, Sanger, and Booth (1995) to decompose the spread.[11] The intuition behind the Lin, Sanger, and Booth (1995) procedure is that temporary changes in stock prices associated with transactions are likely attributable to order processing costs, while permanent changes are more likely attributable to adverse selection costs.[12] The appendix details the methodological procedures employed. Note that we report adverse selection costs as a percent of the stock price (quote midpoint) rather than as a percent of the spread so we can compare adverse selection costs between firms whose spreads contain differing order-processing costs. We have also used alternative techniques to decompose the spread into its components. Specifically, we used the approach of George, Kaul, and Nimalendran (1991) as modified by Neal and Wheatley (1998). The results (not reported) were very similar to those reported below.

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[11] We exclude observations for which we could not construct sensible measures of adverse selection costs, i.e., adverse selection component less than 0% and greater than 100% of the spread.

[12] This method relies importantly on the results of Stoll (1989) and Madhavan and Smidt (1991) that suggest that inventory costs are negligible.

One criticism of the use of spread or spread-based measures as information asymmetry proxies is that they measure only the costs of trading a small number of shares. For large buy (sell) orders, the average purchase (sale) price is likely to be well above (below) the quoted offer (bid). O'Hara (1995)[13] argues that "examining only the small-trade spread cannot provide a good indication of the extent of asymmetric information or the costs of trading." Thus, as a third measure of information asymmetry, we use LAMBDA, the price impact of trading large quantities of stock. This variable is, in essence, the inverse of market depth and represents the percentage stock price change for each thousand shares bought or sold.[14] We calculate it using the approach of Hasbrouck (1991) as modified by Foster and Viswanathan (1993) and implemented by Brennan and Subramanyam (1995). We document the methodology in more detail in Appendix b.

In a market with asymmetrically informed agents, trades convey information and impact security prices. The magnitude of the price impact for a given trade is increasing in the degree of information asymmetry, and firms whose share prices respond less for a given unit of trading volume are perceived to have lower levels of information asymmetry. Thus, less information asymmetry corresponds to smaller sensitivity of prices to trades and smaller observed LAMBDAs.

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[13] Page 70.

[14] For example, stock prices would be expected to rise (fall) by 100*LAMBDA percent for a 100,000 share buy (sell) order.

Our fourth measure of information asymmetry is trading volume. Our volume measure is the monthly stock turnover (TURNOVER), calculated as monthly trading volume divided by number of shares outstanding. Turnover can be interpreted as a measure of the heterogeneity of beliefs regarding firm value. Greater disagreement and larger turnover could be an indication of the lack of available information about a firm. For example, Krinsky and Lee (1996) document that turnover and adverse selection costs increase in periods immediately around earnings announcements, a finding they attribute to higher levels of asymmetric information during these periods.

Our final measure of asymmetric information is the standard deviation of daily stock returns (STDRET) calculated using CRSP data.[15] We use a full year's data, rather than three months of data, in calculating this variable to increase the accuracy of our estimates. As in Bhagat and Frost (1986) and Dierkens (1991), we associate greater volatility with higher levels of asymmetric information. A stock that experiences larger price movements in response to new information concerning the stock will have greater standard deviation of returns.[16] Further, in many models of informed trading (e.g., Kyle

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[15] We have repeated all of our tests using the standard deviation of excess returns and obtained very similar results. Since the market microstructure literature has generally focused on the variance of raw returns, we report results for STDRET only.

[16] STDRET is almost certainly an overstatement of information asymmetry since it includes the impact of information that was previously unavailable to both managers and outsiders.

(1985)), insiders can perfectly predict the future stock price. Thus, the expected profit of the insider and, hence, the magnitude of the asymmetric information problem both increase directly with the variance of the security.

Diversification Measures

As our primary measure of diversification, we use an asset based Herfindahl Index, which we call HERF. This variable reflects the degree to which the assets of a firm are concentrated within its divisions. For each firm, HERF is calculated as the sum of the squares of each segment's assets as a proportion of the firm's total assets. Thus, for firm i in year t we measure HERF as

$$\mathrm{HERF}_{it}=\sum_{j=1}^{N_{it}}\left(TA_{jit} \Big/ \sum_{j=1}^{N_{it}} TA_{jit}\right)^{2},$$

where N_{it} is the number of segments of firm i at time t and TA_{jit} are the assets attributable to segment j of firm i at time t. HERF equals 1 for all single segment firms and is less than 1 for multiple segment firms, where smaller levels of HERF correspond to less concentration of assets among segments and greater diversification.[17]

Diversification Discount and Inefficient Investment Variables

As a relative valuation measure, we calculate the market-to-book ratio that each diversified firm sells at relative to a portfolio of comparable focused firms. We call this

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[17] A potential weakness of the within-firm Herfindahl index is that it makes no distinction between related and unrelated diversification. As an alternative to HERF, we used the Caves, Porter, and Spence (1980) concentric index, which captures the degree of unrelated diversification, and obtained very similar results. Additionally, we obtained similar results when we used either a multiple segment dummy or the number of reported segments as our diversification proxies. Thus, our reported results are quite robust to the choice of diversification metric.

variable RELATIVQ and it is calculated using the asset multiplier methodology of Berger and Ofek (1995). RELATIVQ is the natural logarithm of the ratio of a firm's actual market-to-book to its imputed market-to-book. A firm's imputed market-to-book is calculated as the weighted sum of the imputed market-to-book ratios of each of its segments. Each segment's imputed ratio is defined as the median market-to-book ratio of single segment firms in the same industry and each segment's weight is the ratio of its assets relative to the sum of all segment assets.[18] Firms with RELATIVQ>0 trade at a diversification premium while firms with RELATIVQ<0 trade at a diversification discount.

Previous authors document that the magnitude of RELATIVQ is influenced by the investment efficiency of diversified firms' internal capital markets (e.g., Berger and Ofek (1995) and Billett and Mauer (1998)). As our proxy for the efficiency of firms' internal capital markets, we follow Billett and Mauer (1998) in measuring the net investment efficiency of firms' internal capital markets (ICM) as

$$ICM = \left(\frac{1}{\sum_{j=1}^{N_{it}} TA_{jit}} \right) \sum_{j=1}^{N_{it}} \left(\frac{CF_{jit}}{TA_{jit}} - IND_j \left(\frac{CF_t}{TA_t} \right) \right) Max\left[Min\left(CAPX_{jit} - CF_{jit}, CAPX_{jit} \right), 0 \right]$$

where N_{it} is the number of segments of firm i at time t and TA_{jit} are the assets attributable to segment j of firm i at time t, CF is the cash flow of segment j of firm i at time t measured as segment EBIT plus segment depreciation, $IND_j(CF_t/TA_t)$ is the ratio of cash

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[18] Note, we use all single-segment firms on Compustat (i.e., not just those in our sample) in a given year to obtain industry medians.

flow to assets for the median single segment firm in segment j's industry at time t, and $CAPX_{jit}$ is segment j's capital expenditures at time t.

The internal capital market measure reflects the overall net value of subsidies to segments. Billet and Mauer (1999) argue that subsidies are inefficient when provided to segments with negative industry adjusted returns and efficient when provided to segments with positive industry adjusted returns. ICM will be positive when segments with positive industry adjusted return on assets are subsidized, i.e., segments invest considerably more than their own segment cash flows would permit. ICM will be negative when segments with negative industry adjusted return on assets are subsidized.

Results

Univariate Results

Table 4-2 reports descriptive statistics grouped by whether the firm reported having multiple segments or a single segment. Multiple segment firms have lower spreads, lower adverse selection costs, and greater market depth than single segment firms. Further, multiple segment firms have both lower turnover and less volatile stock returns which, taken together, are consistent with less dispersion of beliefs regarding firm value. The results appear consistent with the information diversification hypothesis. However, given that the information diversification hypothesis and the transparency hypothesis are not mutually exclusive, a more cautious interpretation is that the information diversification effect dominates the transparency effect. Further, simple univariate comparisons ignore many potential differences between diversified and focused firms that could also affect information asymmetry. Thus, in our matching analysis below, we compare diversified firms with portfolios of focused firms that mimic diversified firms in terms of segment size and industry.

While the multiple segment firms in our sample exhibit varying levels of industry focus, the median HERF is 0.52. This corresponds to a two-segment firm with roughly 60% of its assets in one industry and 40% of its assets in another industry. Multiple segment firms are substantially larger in terms of total assets (ASSETS), market capitalization (MVE), and stock price (PRICE). While multiple segment firms utilize similar leverage (LEVG), they hold lower levels of cash (CASHTA), defined as the ratio of cash and short-term investments to total assets.[19] This is consistent with multiple segment firms maintaining somewhat lower levels of financial slack.

Consistent with Lang and Stulz (1994), diversified firms have lower market-to-book ratios (MB), defined as the ratio of the firm's market value (market value of equity plus the book value of total assets minus the book value of equity) to the firm's book value of total assets. Further, the mean (median) RELATIVQ for diversified firms in our sample is –2.2% (-5.7%). Thus, diversified firms in our sample trade at significant discounts to portfolios of industry median pure-play firms, on average. Similarly, Billett and Mauer (1998) report that for diversified firms on Compustat over the period 1989-1996, the mean (median) RELATIVEQ was –4.7% (-6.0%). Finally, diversified firms in our sample have a mean (median) ICM of -3.5% (0.0%). Thus, diversified firms in our sample appear to be inefficient investors on average. In comparison, Billett and Mauer (1998) report a mean (median) ICM of –5.2% (0.0%) for their sample.

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[19] LEVG is the ratio of long-term debt and debt in current liabilities to total assets. In the 36 observations where leverage was greater than 1, we set LEVG equal to 1.

Matching Procedure

In an effort to determine the relationship between firm diversification and asymmetric information, we consider the implications of breaking each conglomerate in our sample into separate stand-alone entities. More specifically, we compare the information asymmetry characteristics of diversified firms with those they could reasonably expect to exhibit if they were split into portfolios of separately traded firms along industry lines. To construct these implied break-up information asymmetry measures, we proceed by matching the segments of conglomerate firms with stand-alone firms that operated in the same industries and were similar in size (segment assets).

The procedure for choosing matching firms is described here. For each year, we first identify all the distinct industry segments of our multiple segment firms. We then identify for each segment those focused firms in our sample that operated in the same industry (3 digit SIC code) as the segment during the same year. We choose as a tentative match the focused firm in the same industry as the segment that is closest in size (assets) to the segment. In order to obtain a reasonable trade-off between industry and size matching, we impose the condition that the assets of the matching firm must be at least 50% but not more than 200% of the assets of the segment. If such a match is not found at the 3 digit level, we choose among the possible matching firms at the 2 digit level. If the size criterion is not met at the 2 digit level, then we choose among the possible matching firms at the 1 digit level. If there is no match at the 1 digit level, then the segment goes unmatched.

The 1,350 multiple segment firm years in our sample included 5,232 distinct segment years. Matching firms that met the screens above were identified for 4,911 of these segment years. In our sample, 2,660 segment years had suitable matches at the 3 digit level, 1,379 segment years had matches available at the 2 digit level but not the 3 digit level, and 872 segment years had matches available only at the 1 digit level. The mean (median) ratio of segment assets to matching firm assets is 0.99 (0.99). Thus, the focused firms are very close in size to their segment counterparts. A total of 1,144 multiple segment firm years had each of its industry segments matched with a focused firm of similar size and industry affiliation. These matching firms are used to construct portfolios of focused firms that approximate diversified firms in terms of segment size and industry composition.

Each of the implied break-up information asymmetry measures that we calculate takes the general form

$$\text{PFLIA}=\sum_{j=1}^{N} w_j * MFIA_j ,$$

where w_j is the ratio of segment j's assets to the sum of segment assets, MFIA_j is the matching firm information asymmetry, and the summation is over the N segments of the diversified firm. Thus, PFLIA is a weighted average of the information asymmetry measures of matching firms where the weights are the respective sizes of the segments relative to the conglomerate. In essence, these weighted averages reflect the information asymmetry characteristics that diversified firms would be expected to exhibit if they were split into separately traded firms along industry lines. We use quoted spreads, adverse selection costs, market depth, share turnover, and the standard deviation of daily stock returns as our measures for these tests.

As an additional test of the transparency hypothesis, we also examine a second stock market return variance measure. This variable, STDRETCV, is the standard deviation of matching firm *portfolio* daily returns given the actual covariances that exist between matching firm returns. STDRETCV can be interpreted as the standard deviation of returns that a conglomerate could expect if it instead traded as a portfolio of individual stocks. If a conglomerate did instead trade as a portfolio of individual stocks, then it would clearly not be subject to any diversification related transparency problems. Thus, by comparing a conglomerate's actual standard deviation of returns with the standard deviation of returns of the matching portfolio, we can determine if corporate diversification does in fact affect transparency.

Matching Results

Panel A of Table 4-3 contrasts the information asymmetry characteristics of conglomerates with their implied break-up characteristics. Diversified firms have significantly smaller quoted spreads, adverse selection costs, and turnover relative to similarly constructed portfolios of focused firms. Likewise, diversified firms have greater depth. Thus, splitting diversified firms along industry lines would appear to exacerbate information asymmetry problems for most firms. These results are consistent with the information diversification effect dominating the transparency effect. Further, these results call into question the relative information benefits of stock break-ups for most diversified firms. For example, in 75% (or 847 of 1,144) of our conglomerate firm-years, diversified firms had adverse selection costs that were smaller than those they could expect as pure play firms.

While diversified firms have less variable daily stock returns (2.01%) relative to the weighted average variability of matching firm returns (2.44%), diversified firms have more variable daily stock returns relative to the variability of matching portfolio returns (1.84%). Thus, diversification is accompanied by a decrease in transparency in the sense that if diversified firms were broken up into separately traded securities and held in portfolios with weights corresponding to the respective segment sizes, they would have less variable daily returns. However, as Gorton and Pennacchi (1993) and Subramanyam (1991) imply, the basket security benefits attendant with corporate diversification cannot be obtained by holding a portfolio of separately traded firms. For example, to replicate the holdings of a conglomerate, an investor would have to pay the adverse selection costs of trading each individual security. Also, splitting a conglomerate into separately traded and operated firms in an effort to further reduce the variability of returns will preclude the firm from benefiting from reduced adverse selection costs when raising capital by issuing a basket security as in Hadlock, Ryngaert, and Thomas (1998).[20] However, given that 25% of the diversified firms in our sample would likely stand to reduce their adverse selection costs by breaking up, transparency problems do appear relevant for a sizable fraction of diversified firms.

The results of Panel A address the question of how information asymmetries would change if conglomerates were broken up into separately traded firms. To gain additional insight regarding the effects of diversification on information problems, we

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[20] One possible motivation for issuing tracking stock or targeted stock is that it may allow a firm to reduce transparency problems and still benefit from raising capital by selling a basket security. The implications of tracking stock issues are examined in Billett and Mauer (1998), Hass (1996), and Zuta (1997).

implemented an alternative matching procedure in which we matched not by *segment* size but by *conglomerate* size (market capitalization) and stock price. Specifically, we matched the segments of our diversified firms with focused firms that operated in similar industries and were closest in market capitalization to the conglomerate while still having a stock price within ± 25% of the conglomerate stock price. A total of 917 multiple segment firm years had matches for each segment.

In effect, the information asymmetry measures of these matching portfolios represent those that diversified firms could be expected to exhibit if the firms were split into separately traded securities along industry lines with each new firm as large as the conglomerate and with stock price similar to the conglomerate. Clearly, this is unrealistic since it is, by definition, impossible to split conglomerates into separately traded firms each the same size as the conglomerate. Thus, we view this test as an attempt to establish whether transparency effects might be economically significant on average if we compared diversified firms with the largest and most liquid firms in their segments' industries.

The results reported in panel B of Table 4-3 indicate that diversified firms are, at worst, no less transparent than the large stand-alone firms. On average, diversified firms have very similar quoted spreads, adverse selection costs, and market depths relative to portfolios of large focused firms. However, diversified firms still display much less turnover and less variable stock returns than large focused firms. Thus, there appears to be less dispersion of beliefs regarding firm value for conglomerates relative to even portfolios of large focused firms. Therefore, we interpret the results of panel B as strong evidence in favor of the information diversification effect dominating the transparency effect for most firms.

The results we report in Table 4-3 are robust to several changes in the matching procedures. For example, we obtain results very similar to those reported in Panel A when we match on segment size and industry and also conglomerate price. In addition, no results were materially affected by broadening or narrowing the respective size screens.

Information Asymmetry and Relative Valuation Results

From the above tests, we conclude that, on average, conglomerates appear to have somewhat lower stock market based measures of asymmetric information than their segments would exhibit as stand alone entities. There is, however, substantial cross sectional variation among conglomerates in the level of information asymmetry. Indeed, 25% of conglomerates in our sample might stand to reduce asymmetric information via a break-up. In this section, we investigate whether differences in relative valuation might in part be explained by how much diversification improves (or worsens) information problems for given firms. Higher levels of asymmetric information are generally associated with higher costs of external finance (e.g., see Amihud and Mendelson (1988)). Thus, all else equal, we expect higher levels of asymmetric information will correspond with lower relative valuations.

In the tests that follow, we consider both relative and absolute levels of information asymmetry. For each of our information asymmetry proxies, we define relative information asymmetry as the natural log of the ratio of information asymmetry for the conglomerate to the corresponding implied break-up information asymmetry. For example, ASDIFF is the natural log of the ratio of the conglomerate's adverse selection cost to the adverse selection cost the conglomerate would be expected to exhibit if split along industry lines into separately traded securities. Thus, a diversified firm with negative ASDIFF has less information asymmetry than its matching portfolio. Further, smaller ASDIFF corresponds to lower relative information asymmetry. The interpretation is similar for our market depth measures as well.

In Figure 4-1, we present means for RELATIVQ based on quartiles (smallest to largest) of ASDIFF. While diversified firms with low relative levels of information asymmetry trade at diversification premiums on average, diversified firms with high relative levels of information asymmetry trade at discounts on average. This finding is consistent with differences in asymmetric information being reflected in firm value.

In Table 4-4, we present mean and median RELATIVQ based on quartiles of relative and absolute adverse selection and market depth. Diversified firms that have lower adverse selection costs (both relative and absolute) trade at higher industry adjusted market-to-book ratios. The results for market depth are similar in that diversified firms with greater market depth (smaller LAMBDIFF and LAMBDA) also trade at higher industry adjusted market-to-book ratios. Regardless of whether we examine relative or absolute information asymmetry, RELATIVQ is always significantly higher for firms in the low information asymmetry quartile relative to the high information asymmetry quartile.

Previous papers have focused on the investment activities of diversified firms in explaining differences in relative value across diversified firms (e.g., see Berger and Ofek (1995) and Billett and Mauer (1998)). The results are generally consistent with diversified firms having lower relative valuations if they overinvest in segments with limited investment opportunities. Given that the results in Table 4-4 do not control for differences in firms' investment efficiency, we regress relative valuation on our information asymmetry measures, an investment efficiency measure, and other control variables.

In those regressions where the information asymmetry measure is based on the difference between conglomerate information asymmetry and the matching portfolio, we include a measure of the differences in size between the conglomerate and the firms constituting its matching portfolio (SIZEDIFF). SIZEDIFF is the natural log of the ratio of a conglomerate's assets to the average assets of the firms constituting the matching portfolio. In those regressions using absolute measures of information asymmetry, we follow Berger and Ofek (1995) and include a measure of absolute firm size (ln(ASSETS)). We include our diversification measure (HERF), leverage, and the ratio of cash and marketable securities to total assets. We use the Billet and Mauer (1999) investment efficiency variable, ICM to construct a binary variable, GOODICM, which takes a value of one if $ICM \geq 0$ and zero if $ICM < 0$.

Since our measures of asymmetric information are stock market based, the potential exists for spurious correlation between relative valuation and these measures. Companies with "hot" stocks, i.e., those that have experienced rapid increases in value, may potentially be both higher valued and more liquid simply because of the runup. For this reason, we include as an additional control variable, RUNUP, defined as the compounded daily stock return over the previous year.

Column 1 of Table 4-5 presents results of a regression of RELATIVQ on ASDIFF. The coefficient on ASDIFF is negative and highly significant consistent with diversified firms that have lower levels of relative information asymmetry trading at higher relative values. The coefficients on the control variables are in line with expectations, i.e., firms with efficient internal capital markets sell at higher multiples as do firms that experienced greater stock price appreciation.

Column 2 presents results using our absolute information measure. Again, higher levels of information asymmetry are associated with lower relative valuation. Interestingly, the coefficient on GOODICM is now insignificant. Columns 3 and 4 present results using our market depth measures of information asymmetry. Regardless of which measure of information asymmetry we use, it appears that diversified firms that have lower levels of information asymmetry trade at higher multiples.

The results reported in Table 4-5 are robust to several changes in the specification. To mitigate potential problems with errors being cross-sectionally correlated, we ran the regressions separately for each year. The coefficients on our information asymmetry variables were always significant at the 1% level. As an additional robustness check, we replaced our asymmetric information proxies with their lagged values. Finally, we ran the regressions without including RUNUP. The results in all cases were very similar to those reported.

Conclusion

In this paper, we find evidence that corporate diversification affects the level of asymmetric information surrounding a firm and that the level of asymmetric information is an important determinant of relative firm value. We find results indicating approximately 75% of the diversified firms in our sample have lower levels of asymmetric information as conglomerates than they would have as separately traded pure-play firms. Further, we find that those firms with the largest information benefits of diversification trade at the highest relative values to similarly constructed portfolios of pure-play firms.

Our results imply that there may be significant costs inherent in conglomerate break-ups for a large number of diversified firms. These potential costs appear highest for those conglomerates whose segments would face the greatest information problems as stand-alone firms. While we examine large publicly traded firms in the United States, we expect the results would be even more pronounced in countries with less well-developed capital markets. Our results are thus consistent with the recent findings of Fauver, Houston, and Naranjo (1999) of diversification *premia* for conglomerates in developing capital markets.

Our results also reconcile well with those of recent papers documenting gains to break-ups. Denis, Denis, and Sarin (1998) and Berger and Ofek (1999) report that firms with the largest diversification discounts are the most likely to refocus and experience the most positive market revaluations around restructuring-related announcements. While the size of the diversification discount has been empirically linked to inefficient investment, Schlingeman, Stulz, and Walkling (1998) find that overinvesting segments are not typically divested. Thus, the value created in break-ups may not be entirely attributable to improved investment efficiency.

Our results suggest the observed value gains associated with stock break-ups may be in part attributable to improvements in transparency among those firms with the most severe information problems. Given that firms in our sample with the largest levels of information asymmetry also have the largest diversification discounts, these firms would presumably stand to realize value gains from reducing information asymmetry. Correspondingly, Krishnaswami and Subramaniam (1999) find evidence that those firms with the largest levels of information asymmetry are the most likely to conduct spin-offs and realize the largest value gains. Thus, our results appear to provide additional insight regarding the link between the relative effects of diversification and observed break-up behavior.

Table 4-1
Sample Characteristics

Panel A: Frequency of Observations by Forecast Year and Firm-Type

Year	Multiple Segment	Single Segment	Total
1993	439	693	1,132
1994	462	771	1,233
1995	449	815	1,264
Totals	1,350	2,279	3,629

Panel B: Frequency of Observations as a Function of Firm, Industry, and Year

		Number of Times Represented				
	Total	Minimum	Maximum	Mean	Median	Standard Deviation
Firm	1,453	1	3	2.73	3	0.57
Industry	213	1	124	38.59	27	31.75
Year	3	1,132	1,264	1,213	1,233	55.58

This sample includes firms with transactions data available from the NYSE's TAQ Database for the first three months of 1993,1994, and 1995. Firms must be listed on the NYSE or Amex and also have data available from Compustat and CRSP. Firms with reported business segments that are regulated utilities (SIC codes between 4800-4829 and 4910-4949) or financial services operations (SIC codes between 6000-6999) are excluded as are foreign firms, ADRs, and REITs. Additionally, firm-month observations are excluded if a firm experienced a stock split or stock dividend or the average monthly stock price was less than $3 or less than 30 transactions occurred in the month. Finally, we exclude those firms where the quoted spread exceeded 30% of the stock price or the estimated adverse selection component was less than 0% or greater than 100% of the spread.

Table 4-2
Descriptive Statistics by Firm-Type

	Multiple Segment (n=1,350)		Single Segment (n=2,279)		Differences	
	Mean	Median	Mean	Median	Means	Medians
SPREAD	2.66%	1.81%	3.00%	2.36%	-0.34%***	-0.55%***
ESPREAD	1.04%	0.72%	1.27%	0.98%	-0.23%***	-0.26%***
ASCOST	0.39%	0.26%	0.48%	0.34%	-0.09%***	-0.08%***
LAMBDAx10	0.46%	0.07%	0.59%	0.11%	-0.13%***	-0.04%***
TURNOVER	7.27%	5.50%	8.74%	6.05%	1.47%***	0.55***
STDRET	2.14%	1.83%	2.52%	2.24%	-0.38%***	-0.41%***
HERF	0.55	0.52	1.00	1.00	-0.55	-0.48
PRICE	27.80	22.47	20.63	16.57	7.17***	5.90***
ASSETS	2,668.67	651.27	1,046.31	300.49	1,622.36***	350.78***
MVE	2,465.27	528.34	1,082.28	256.79	1,382.99***	271.55***
LEVG	26.35%	24.19%	26.30%	23.64%	0.05%	0.55%*
CASHTA	8.19%	4.48%	10.55%	5.09%	-2.36%***	-0.61%**
RUNUP	16.36%	8.14%	17.96%	6.67%	-1.60%	1.47%*
MB	1.64	1.40	1.93	1.47	-0.29***	-0.07***
RELATIVQ	-2.17%	-5.69%	5.11%	0.00%	-7.28%***	-5.69%***
ICM	-3.48%	0.00%	-	-	-	-

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

SPREAD is the quoted spread as a percentage of the stock price. ESPREAD is the effective spread as a percentage of the stock price. ASCOST is the adverse selection component estimated as in Lin, Sanger, and Booth (1995) expressed as a percentage of stock price. LAMBDA is the percentage stock price change for each thousand shares bought or sold. TURNOVER is average monthly trading volume divided by shares outstanding. HERF is the asset-based Herfindahl Index. PRICE is the average stock price. STDRET is the standard deviation of daily returns over the entire year. ASSETS are total assets in millions of dollars. MVE is the market value of equity in millions of dollars. LEVG is the ratio of long-term debt and debt in current liabilities to total assets. CASHTA is the ratio of cash and short-term investments to total assets. RUNUP is the compounded daily return over the previous year. MB is the ratio of the firm's market value (market value of equity plus the book value of total assets minus the book value of equity) to the firm's book value of total assets. RELATIVEQ is the natural log of the ratio of actual market-to-book to imputed market-to-book. A firm's imputed market-to-book is calculated using the asset multiplier methodology of Berger and Ofek (1995). ICM is a measure of the net efficiency of a firm's internal capital market as in Billett and Mauer (1998).

Table 4-3
Matching Results

Panel A: Matching by Segment Size and Industry

	Conglomerate Mean	Matching Portfolio Mean	Differences
SPREAD	2.37%	3.07%	-0.70%***
ASCOST	0.35%	0.47%	-0.12%***
LAMBDA	0.04%	0.06%	-0.02%***
TURNOVER	7.20%	8.23%	-1.02%***
STDRET	2.01%	2.44%	-0.43%***
STDRETCV	2.01%	1.84%	0.17%***

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

Panel B: Matching by Conglomerate Size and Price and Segment Industry

	Conglomerate Mean	Matching Portfolio Mean	Differences
SPREAD	2.54%	2.44%	0.09%
ASCOST	0.37%	0.36%	0.01%
LAMBDA	0.04%	0.04%	0.00%
TURNOVER	7.26%	10.24%	-2.98%***
STDRET	2.04%	2.24%	-0.20%***
STDRETCV	2.04%	2.03%	0.01%

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

The Panel A sample includes 1,144 multiple segment firm years with size and industry matched focused firms for each segment year. The Panel B sample includes 917 multiple segment firm years with segment industry and conglomerate size and conglomerate stock price matched focused firms for each segment year. SPREAD is the quoted spread as a percentage of the stock price. ASCOST is the adverse selection component estimated as in Lin, Sanger, and Booth (1995) expressed as a percentage of stock price. LAMBDA is the percentage stock price change for each thousand shares bought or sold. TURNOVER is average monthly trading volume divided by shares outstanding. STDRET is the standard deviation of daily returns over the entire year. Matching portfolio measures of information asymmetry are calculated as $\Sigma w_j * MFIA_j$, where w_j is the ratio of segment j's assets to the sum of segment assets, $MFIA_j$ is the matching firm information asymmetry, and the summation is over all segments of the multiple segment firm. STDRETCV is the standard deviation of daily returns allowing for the covariance of returns among matching portfolio firms as opposed to the strict weighted average as in STDRET.

Table 4-4
Relative Valuation as a Function of Information Asymmetry

Sort Variable		Quartile 1	Quartile 2	Quartile 3	Quartile 4	Q1-Q4
ASDIFF	Mean	13.61	3.77	-7.17	-15.08	28.69***
	Median	5.29	2.50	-9.03	-15.18	20.47***
	N	286	286	286	286	
ASCOST	Mean	7.04	3.90	-1.37	-18.26	25.30***
	Median	4.70	-1.51	-7.96	-23.29	27.99***
	N	338	337	338	337	
LAMBDIFF	Mean	11.44	2.30	-7.34	-10.65	22.09***
	Median	4.80	-1.43	-8.87	-12.42	17.22***
	N	286	286	286	286	
LAMBDA	Mean	3.12	3.42	-3.07	-12.14	13.96***
	Median	1.45	-0.13	-7.44	-17.35	18.80***
	N	338	337	338	337	

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

RELATIVQ sorted on the basis of stock market based measures of information asymmetry. RELATIVEQ is the natural log of the ratio of actual market-to-book to imputed market-to-book. A firm's imputed market-to-book is calculated using the asset multiplier methodology of Berger and Ofek (1995). ASCOST is the adverse selection component estimated as in Lin, Sanger, and Booth (1995) expressed as a percentage of stock price. ASDIFF is the natural log of the ratio of a conglomerate firm's adverse selection cost to that of a segment size and industry matched portfolio of focused firms. LAMBDA is the percentage stock price change for each thousand shares bought or sold. LAMBDIFF is the natural log of the ratio of a conglomerate firm's LAMBDA to that of a segment size and industry matched portfolio of focused firms. Differences in means assessed using a Mann-Whitney test. Differences in medians assessed using a Median Scores test.

Table 4-5
Regressions of Relative Valuation on Information Asymmetry

Regression	(1)	(2)	(3)	(4)
INTERCEPT	-0.05 (-0.56)	-1.08*** (-11.99)	-0.03 (-0.28)	-0.57*** (-7.17)
ASDIFF	-0.18*** (-9.83)			
ln(ASCOST)		-0.28*** (-11.60)		
LAMBDIFF			-0.07*** (-6.21)	
ln(LAMBDA)				-0.11*** (-9.04)
SIZEDIFF	-0.12*** (-3.06)		-0.10** (-2.54)	
ln(ASSETS)		-1.11*** (-8.15)		-0.09*** (-6.45)
HERF	-0.01 (-0.12)	0.03 (0.56)	-0.05 (-0.46)	-0.01 (-0.11)
GOODICM	0.05* (1.90)	0.01 (0.37)	0.05** (2.05)	0.02 (0.82)
LEVG	-0.10 (-1.13)	0.13 (1.60)	-0.31*** (-3.49)	-0.14* (-1.76)
CASHTA	0.07 (0.44)	0.23 (1.48)	0.02 (0.12)	0.26 (1.55)
RUNUP	0.06** (1.99)	0.04** (2.10)	0.10*** (3.05)	0.08*** (3.75)
Adjusted R^2	0.13	0.15	0.11	0.13
Observations	1,144	1,350	1,144	1,350

***(**,*) denotes significance at the 0.01 (0.05,0.10) level.

The dependent variable is REATIVQ. RELATIVQ is the natural log of the ratio of actual market-to-book to imputed market-to-book. A firm's imputed market-to-book is calculated using the asset multiplier methodology of Berger and Ofek (1995). ASCOST is the adverse selection component estimated as in Lin, Sanger, and Booth (1995) expressed as a percentage of stock price. ASDIFF is the natural log of the ratio of a conglomerate firm's adverse selection cost to that of a segment size and industry matched portfolio of focused firms. LAMBDA is the percentage stock price change for each thousand shares bought or sold. LAMBDIFF is the natural log of the ratio of a conglomerate firm's LAMBDA to that of a segment size and industry matched portfolio of focused firms. SIZEDIFF is the ratio of conglomerate assets to the average assets of the focused firms in the matching portfolio. ASSETS are total assets in millions of dollars. HERF is the asset-based Herfindahl Index. GOODICM is a binary variable that equals one if the

Billett and Mauer (1998) internal capital market measure is nonnegative and zero otherwise. LEVG is the ratio of long-term debt and debt in current liabilities to total assets. CASHTA is the ratio of cash and short-term investments to total assets. RUNUP is the compounded daily return over the previous year. The regressions also include dummy variables for 1994 and 1995. The estimated coefficients for the year dummies are not reported below. T-statistics based on the White-adjusted standard errors are in parentheses.

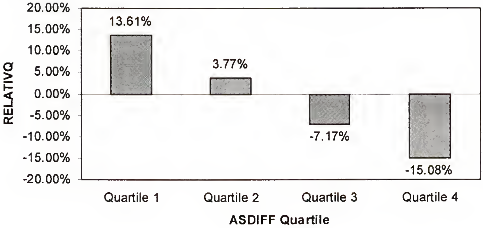

Figure 4-1. Relative Valuation as a Function of Relative Information Asymmetry. RELATIVEQ is the natural log of the ratio of actual market-to-book to imputed market-to-book. A firm's imputed market-to-book is calculated using the asset multiplier methodology of Berger and Ofek (1995). ASDIFF is the natural log of the ratio of a conglomerate firm's adverse selection cost to that of a segment size and industry matched portfolio of focused firms.

CHAPTER 5
DISCUSSION AND CONCLUSION

While reduced information asymmetry is an oft cited benefit of focus, we find that, on balance, diversified firms are subject to either smaller or similar levels of asymmetric information than are focused firms. This relationship holds in three distinct contexts over time and after for controlling for other factors expected to affect asymmetric information. These results call into question the relevance, at least for most diversified firms, of the information benefits often attributed to greater focus. In fact, these results suggest that greater corporate diversification is associated with information benefits on average.

These results may help to shed some light on a nagging question associated with the corporate diversification literature. Namely, why do so many firms remain diversified in light of the evidence that diversification appears to be, on average, a value-reducing strategy? Other authors appeal to problems associated with the separation of ownership and control. However, information concerns certainly could impact a firm's choice to remain diversified rather than refocus. The findings of this dissertation could in part explain the reluctance of many diversified firms to pursue a more focused organizational form due to the informational benefits associated with corporate diversification.

APPENDIX A
DERIVATION AND PROOFS

Project Size

The results we derived in the text were based on comparing the profit rates on investment to the mispricing rates M_A, M_B, M_4, and M_3. To keep the analysis simple, we ignored the term $\tilde{r}I$ in the denominators of these mispricing rates by assuming this term was equal to zero. Thus, strictly speaking, some of our results only hold for extremely small projects. From existing empirical studies we know that $\tilde{r}I$ is likely to be small relative to the expected value of a firm's assets. For example, Jung, Kim, and Stulz (1996) report that for the median firm in their sample the funds raised in an equity issue are 13% of the firm's pre-offer market value. If this figure represents a typical value of I, then the assumption that $\tilde{r}I$ is negligible relative to the firm's existing assets in place is at least approximately true.

To explore what happens when $\tilde{r}I$ is not negligible, let $M_i^{¢}$ be the theoretically correct mispricing rate constructed by modifying M_i to include the term $\tilde{r}I$ in the denominator ($i \in \{ A, B, 4, 3\}$). It will always be the case that $M_i^{¢} < M_i$, and thus including the term $\tilde{r}I$ decreases slightly all of the relevant mispricing rates. What is important is that the mispricing rates of stand alone divisions will decrease more than the corresponding mispricing rates for the conglomerate, since the term $\tilde{r}I$ will be larger as a fraction of the expected value of assets (size) of the stand alone firm. This effect tends to favor stand alone firms versus conglomerates.

In general, we believe this effect will be empirically unimportant for two reasons. First, as discussed above, this effect should be small. Second, this effect is largely an artifact of our assumption that there is symmetric information about the value of the investment project while there is asymmetric information about the value of a firm's assets in place. This assumption, which was made for simplicity, tends to result in a smaller asymmetric information problem for stand alone divisions relative to conglomerates since for the stand alone divisions the investment project is larger relative to the firm's size. Presumably this effect would be less important in a more realistic (and cumbersome) model that included asymmetric information about investment projects. Finally, we note that even when $\tilde{r}I$ is a substantial figure the basic character of the results we report in the text still hold. In particular (1) diversification can either alleviate or exacerbate the asymmetric information problem, and (2) it is often the case that the three pooling outcome is an equilibrium for the conglomerate when the total pooling outcome is not an equilibrium for the conglomerate and when the separating equilibrium is the unique equilibrium for the stand alone divisions.

Proof of Proposition

Writing M_4 and M_3 as functions of x, we want to show that there is an such that $M_4(x)>M_3(x)$ if and only if $x<\bar{x}$. Note that $M_4(x)>M_3(x)$ if and only if

$$\frac{(A_H+B_H)-(\bar{A}+\bar{B})}{(\bar{A}+\bar{B})} > \frac{(A_L+B_H)-E(A+B\,|\,\textit{conglomerate type is not } (H,H)\ )}{E(A+B\,|\,\textit{conglomerate type is not } (H,H)\ )}. \tag{1}$$

If we add 1 to both sides of (4) and simplify, then multiply both sides by $(\overline{A} + \overline{B}) / (A_L + B_H)$, and finally subtract 1 from both sides and rearrange we derive the following inequality

$$\frac{\Delta A}{A_L + B_H} > \frac{(\overline{A}+\overline{B}) - E(A+B \mid \textit{conglomerate type is not } (H,H)\ )}{E(A+B \mid \textit{conglomerate type is not } (H,H)\ )}. \tag{2}$$

Clearly (4) holds if and only if (5) holds. Given our assumptions $B_H = \lambda A_H = \lambda(A_L + \Delta A)$. Thus the denominator of the left side of (5) can be rewritten as $(1+\lambda)A_L + \lambda\Delta A$.

To simplify the right side of inequality (5) we first note that $(\overline{A} + \overline{B}) = (1+\lambda)\overline{A} = (1+\lambda)(A_L + x\Delta A)$. Next we note that E(A+B | *conglomerate type is not (H,H)*) must equal

$$\frac{1}{1-x^2}[(1-x)^2(A_L+B_L) + x(1-x)(A_H + B_L) + (1-x)x(A_L + B_H)] \tag{3}$$

Simplifying (6) and making the appropriate substitutions implies that

$$E(A + B \mid \textit{conglomerate type is not } (H,H)) = (1 + \lambda)[A_L + x\Delta A/(1 + x)]. \tag{4}$$

Substituting the equality in (7) and the derived expressions for $\overline{A} + \overline{B}$ and $A_L + B_H$ into (5) and simplifying results in the inequality

$$\frac{\Delta A}{(1+\lambda)A_L + \lambda\Delta A} > \frac{\Delta A}{A_L(1/x^2 + 1/x) + \Delta A(1/x)} \tag{5}$$

Since (8) is equivalent to (5), it follows that (4) holds if and only if (8) holds. Inspecting inequality (8), we see that the right side of (8) is increasing in x while the left side of the inequality does not depend on x. Additionally, for any $\lambda>1$ it is clear that inequality (8) always holds when x=1 and never holds when x approaches 0. Thus, there must be an such that both sides of inequality (8) are equal. This is the $\bar{x}$ in the statement of proposition. When λ=1 it is clear that $\bar{x}=1$. Finally, note that the right side of inequality (8) is decreasing in λ. Thus if $\bar{x}$ is defined to be the x that makes both sides of (8) equal, an increase in λ must result in a decrease in x to restore equality in (8). Thus, it must be that $d\bar{x}/d\lambda < 0$.

Market Reaction to Equity Issues

In a three pooling outcome equilibrium, the market's assessment of the value of a firm's assets in place following the announcement of an equity issue will be E(A+B | *conglomerate type is not (H,H)*). Before the announcement, the market value of the firm will be $\bar{A} + \bar{B}$. Thus, assuming again that the size of the investment project is negligible, the percentage change in the firm's market value and stock price at the announcement of an equity issue will be

$$\frac{E(A+B \mid \textit{conglomerate type is not } (H,H)\ ) - (\bar{A}+\bar{B})}{(\bar{A}+\bar{B})}. \tag{6}$$

Using the expression derived for $\bar{A} + \bar{B}$ and E(A+B | *conglomerate is not (H,H)*) derived in the proof of the proposition and simplifying implies that (9) equals $[-(x^2/1+x)\,\Delta A]/\bar{A}$.

In a two pooling outcome equilibrium the market reaction to equity issues will be

$$\frac{E(A+B \mid B=B_L\ ) - (\bar{A}+\bar{B})}{(\bar{A}+\bar{B})}. \tag{7}$$

Noting that $E(A+B \mid B=B_L) = \overline{A} + B_L$, $(B_L - \overline{B}) = \lambda (A_L - \overline{A})$, and $(\overline{A} + \overline{B}) = \lambda \overline{A}$ and substituting these into (10) and simplifying implies that (10) is equal to

$[-x\Delta A]/[\overline{A} + \overline{A}/\lambda]$.

APPENDIX B
MICROSTRUCTURE CALCULATIONS

Calculating the Adverse Selection Component of the Spread

The adverse selection component of the bid-ask spread is defined as that portion of the spread which in theory compensates market makers for trading against better informed traders. The method of Lin, Sanger, and Booth (1995), based upon the approach of Stoll (1989) and Huang and Stoll (1994), is one of several attempts to estimate the adverse selection component using transactions level data. They construct a measure, which we call π, which expresses the adverse selection component as a percentage of the effective spread. The effective spread, which reflects the fact that trades sometimes occur within the quoted spread, is defined as twice the absolute difference between a transaction price and the previously prevailing quoted bid or ask. Our measure of adverse selection costs, ASCOST, is calculated by multiplying the π calculated in a given month by the average percentage effective spread within the month. ASCOST is thus an estimate of adverse selection costs as a percentage of stock price.

In order to estimate π, from TAQ for each firm-month we construct a database which matches each transaction in a given stock with the prevailing quote at the time of the transaction. Following Lee and Ready's (1991) suggestion, we consider quotes reported within 5 seconds prior to a trade as having arrived following the trade.[1] We then define the following variables:

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[1] This is the remedy suggested by Lee and Ready (1991) for their observation that quotes are often reported more quickly than trades.

P_t: the natural logarithm of transaction price at time t

Q_t: the natural logarithm of the midpoint of the prevailing quoted spread at time t

Zt: P_t-Q_t, one half the effective spread, signed positive for trades above the quote midpoint (assumed buys) and negative for trades below the quote midpoint (assumed sells)

δ: the order persistence parameter (the probability that the next trade after a buy (sale) will be a buy (sale))

θ: 2δ-1

We then estimate π and δ with the following two regression equations:

$$Q_{t+1} - Q_t = \pi Z_t + \varepsilon_{t+1}$$

$$Z_{t+1} = \theta Z_t + \eta_{t+1}$$

where ε_{t+1} and η_{t+1} are assumed to be uncorrelated random error terms. Thus, π measures how much the fair stock price (the midpoint of the bid-ask spread) moves in response to a transaction as a percentage of the effective spread. This change is assumed to represent the market maker's revised assessment of the stock's value following the information contained in the buy or sell.

Calculating LAMBDA

LAMBDA, the inverse of market depth, is an estimate of how much a firm's stock price changes per unit of volume. This variable is arguably a more accurate measure of the costs of trading than raw spreads for large traders, such as mutual funds. We estimate LAMBDA using the method of Foster and Viswanathan (1993), which in turn is a modification of the VAR method of Hasbrouck (1991).

To calculate LAMBDA we utilize the trade/quote database described above. We further define a trade direction dummy variable, D_t, which is equal to 1 for buy orders and −1 for sell orders. We classify trades above the quote midpoint as buys and those below the quote midpoint as sales. We use the tick rule described in Lee and Ready (1991) to classify those trades which occur at the bid-ask midpoint. We also create a variable V_t, the signed volume, equal to transaction t's volume, in thousands of shares, times D_t.

LAMBDA is calculated as the parameter, λ, in the following two stage regression system:

$$V_t = \alpha + \sum_{j=1}^{5} \beta_j \Delta P_{t-k} + \sum_{k=1}^{5} \gamma_k V_{t-k} + \tau_t$$

$$\Delta P_t = \zeta + \lambda \tau_t + \psi [D_t - D_{t-1}] + \varepsilon_t$$

Where ΔP_t is the change in transaction prices from time t-1 to time t. The error term from the first regression, τ_t, is an estimate of the *unexpected* volume at time t, given the information contained in the previous five trades (volumes and price changes). The coefficient on τ_t in the second equation, the parameter λ, thus measures the price impact of unexpected trading volume. Thus higher levels of LAMBDA are associated with lower market depth.

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